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MODEL AIRPLANE NEWS

OCTOBER 1956—35 CENTS

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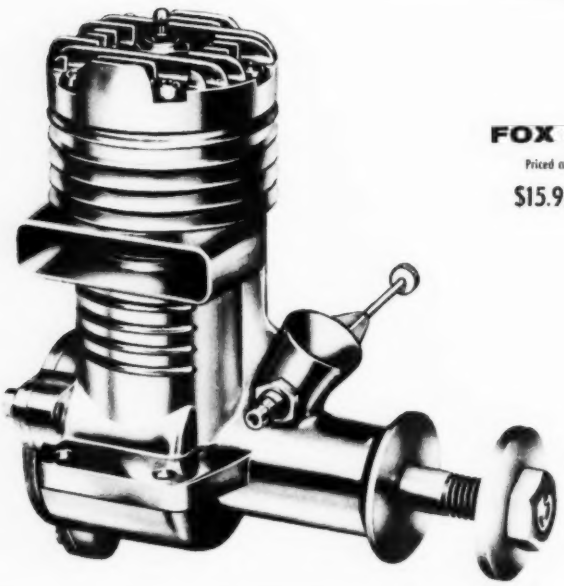
FOX 35

First place winner in every nationals since its introduction.

Winner of more stunt contests than all makes combined.

The motor that was so outstanding that national contest rules were made to fit it.



FOX 35
Priced at
$15.95

The fabulous success of the original Stunt 35 has invited competition. Now with several 35's available, Fox continues to consistently win. There are good reasons, too, for only Fox so successfully blends all that's desirable into one functional unit.

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- One piece crack-up resistant crankcase
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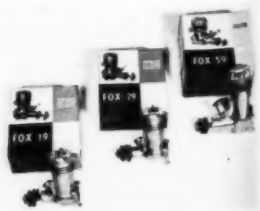

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DESIGNERS AND MANUFACTURERS OF THE WORLD'S FINEST MODEL AIRPLANE MOTORS
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Rubber or Electric Drive! Rubber Power Unit Included in Kit!

the WATER DEVIL

MONOGRAM'S NEW
OPERATING
All-Plastic Model
Runabout

Skipper and Bathing Girl Passenger Included

Kit P17

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- Then get the new Water Devil . . . nearly twice as big as the picture
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- . . . does it go! You get a rubber power unit, with winder, in the
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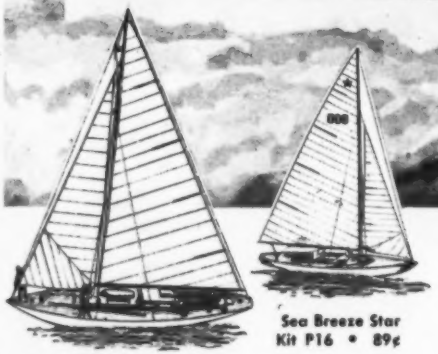
- jet styling, sculptured figures and metalized chrome
- plated deck and other fittings, all in the kit.
- Many other thrilling features too, not
- usually included in scale model kits.
- See the Water Devil at your
- favorite store and get a kit
- for yourself.

Complete
$2.49



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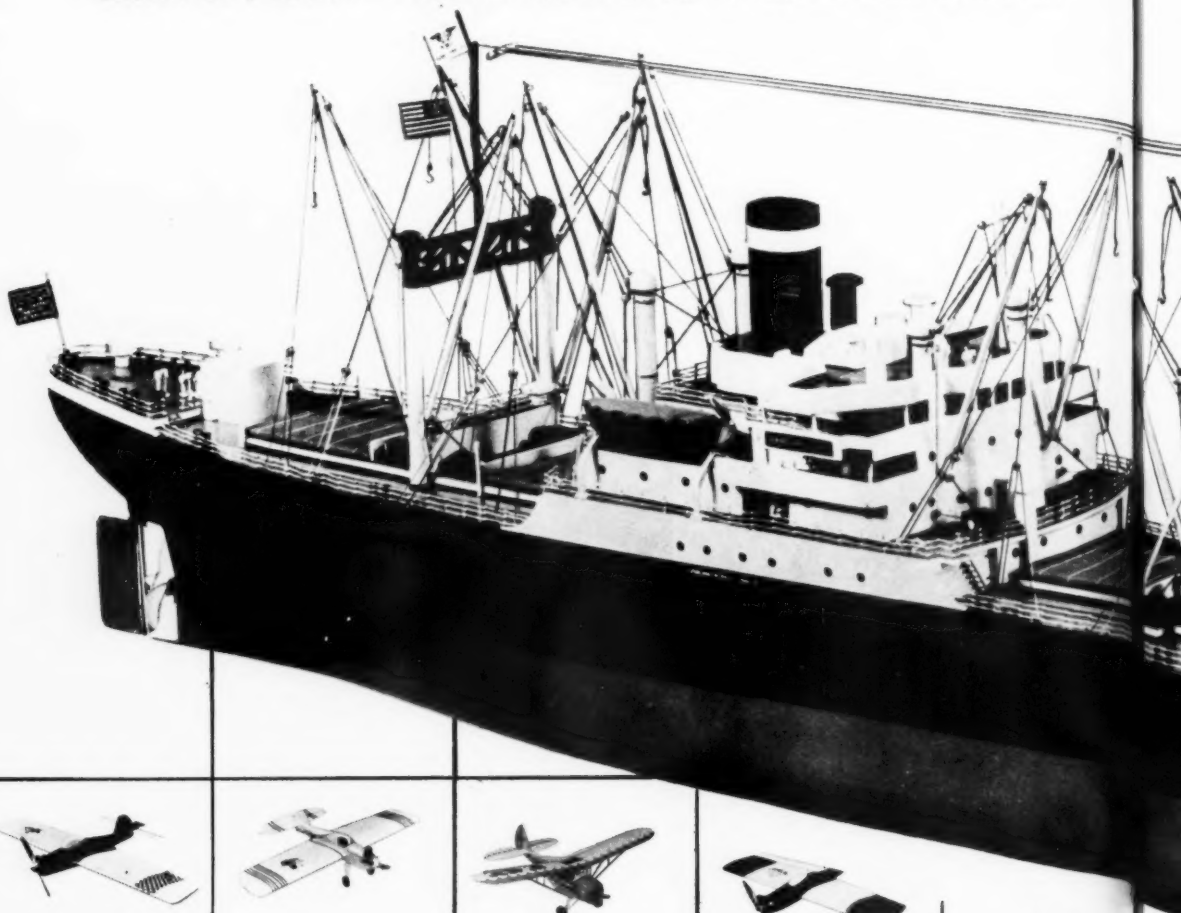

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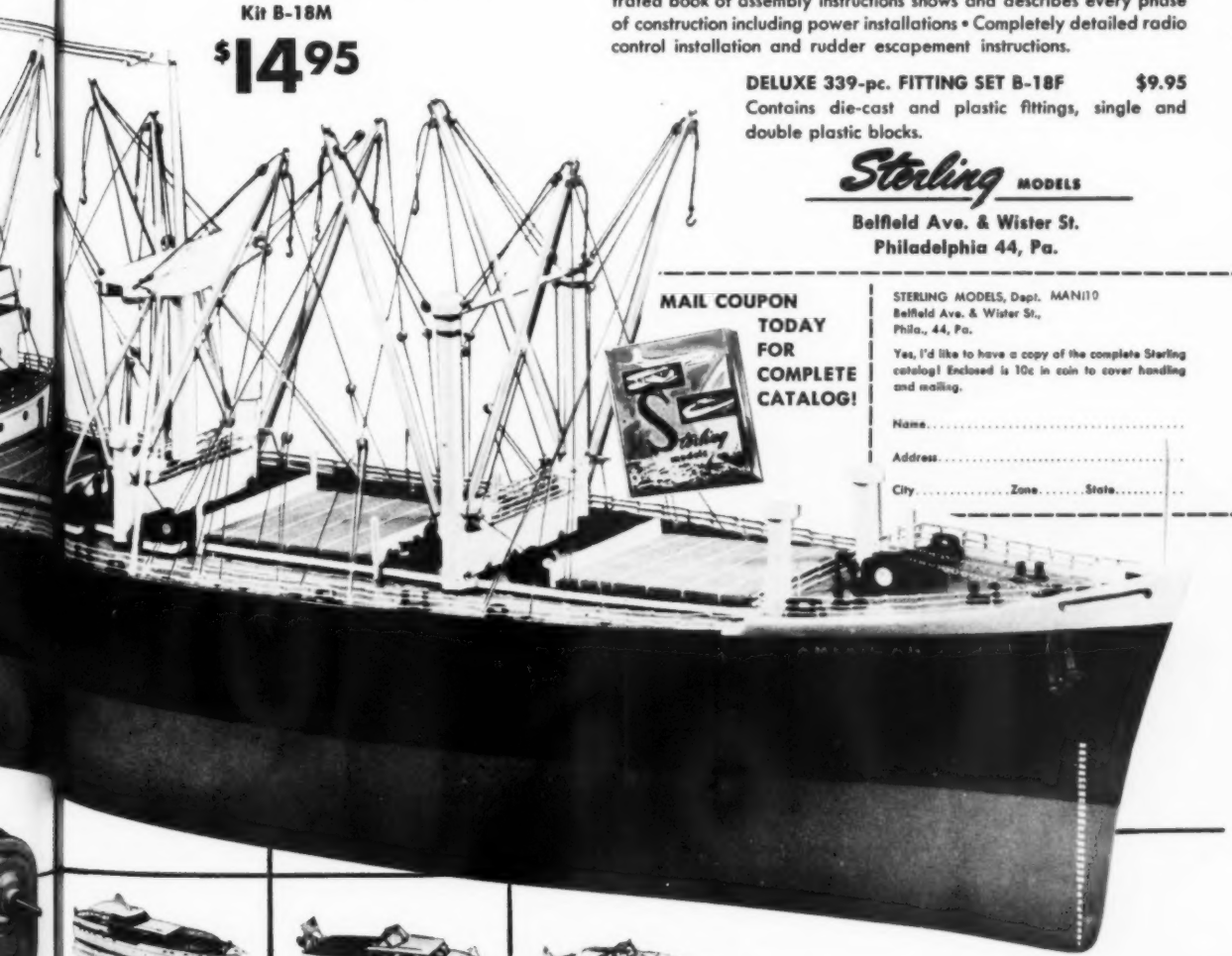

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27th Year of Publication

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JAY P. CLEVELAND, President and Publisher

October, 1956 Vol. LV—No. 4

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by William Winter

► Alone on a quiet summer's evening, tried an interesting experiment with an RC Rebel with the new K & B Allyn .09 up front. With slight left in the airplane allowed it to free flight in slow climbing circles, with transmitter shut off. When, at last, the engine cut, the ship floated slowly down, round and round until, finally, we cut in the transmitter for the landing. In the 75 flights so far logged, the ship has never been stunted, may have been spiraled once or twice, but we are not even sure of that. Just watch it go. An old free-flighter's delight.

It seems to us that the RC picture is getting out of balance. Progress naturally is in the direction of more and better controls. At a price. And, at the same time, far too little attention is given to making RC reliable for the beginner and the sport flier who, too frequently, ends up building boats because they do not fly away. Oh, there are some pretty good radios, but if the industry as a whole put as much effort into making the simple stuff ultra-reliable as they do in creating all kinds of complicated stuff, most of us will be a heck of a lot better off. Some manufacturers are active hobbyists; they know the problems. But we'd like to see all of the creative boys out suffering with the rest of us.

• • •

► Russia has entered a four-man team in the World Championship Model Airplane Competition and, by the time you read this, will have tackled the best ships of 19 other countries, on August 6th, at Cranfield, England. The irony of it! The American modelers busted a gusset year after year to make the finals, but this year our ships had to be proxy flown. Evidence is that the Russians are top-notch modelers and, win, loose, or draw, this is the one year modelers of all nations should have been competing in person. When you consider the caliber of the Americans who made the team this year, it really hurts to know that they could not fly their own ships. Dick Sladek, Larry Conover, Bill Hartill, and W. F. Huffman in gas. Sladek and Huffman, particularly, are old free flight gladiators. Consider the Wakefield team: Cliff Montplaisir, Jerry Kolb, Joe Bilgri, Herb Koethe. Herb is a pay-load pioneer. Excepting Kolb, they have been in the finals before. Kolb a veteran rubber (*Continued on page 7*)

NEXT MONTH'S COVER

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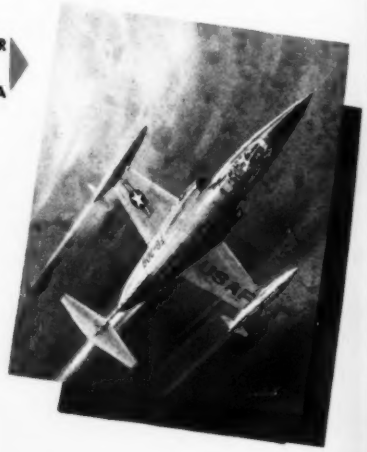

PLANE ON THE COVER

Faster-than-sound, the Navy's new Chance Vought Crusader F8U-1, features a two-position wing to manage lower speeds required for carrier operations. At low speed, the F8U-1 can maintain a level-flight attitude for good pilot visibility. A P & W J57 turbine of 10,000 pounds thrust powers this single-seat day fighter.

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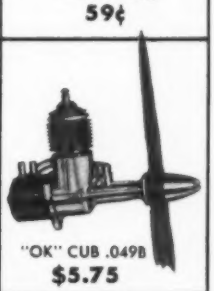

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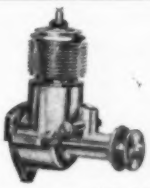

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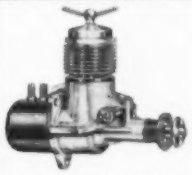

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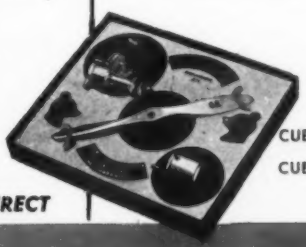

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MAN at Work

(*Continued from page 4*)

man from the 30's. Bilgri is a sure threat anywhere, anytime, Montplaisir a shrewd designer and team veteran. In Nordic it was Hartwill, Bob Moulton, Joe Bilgri, Carl Hermes. Carl, also, has been overseas before.

• • •

► The Ann Arbor Airfoilers is a going club with a plan. Exchange Club sponsorship and a nifty control-line field, thanks to the Department of Parks, provide a big boost, says Clarence Mather, secretary. Along with Chicago's Ed Lidgard, Mather was successful exponent of the contest canard, or tail-first, rubber job. Did all right, too, placing second to Joe Elgin in the '51 Wakefield eliminations in the Windy City. Anyway, the Airfoilers began an achievement program which has really paid off in improved performance. This was done by providing goals to shoot for. At each meeting a large chart is displayed showing members listings and ratings earned. In the winter time, it's indoors in the high school gym—six members even built microfilm jobs. A roving trophy goes to the junior member with highest indoor time. Similar trophies also awarded for outdoor hand launched glider and control line in the summer time. Annual big deal is an Invitational Meet. Don Drury, Pres.; Bill Pearse, VP; Pete Thelan, Treas.; round out the team of officers. (Write Clarence Mather, 1224 Franklin Blvd., Ann Arbor, Mich.).

• • •

► During the no-decision battle over free flight, the ball-point pen mail reached a crescendo. Some very wonderful comments were received from old timers who have forgotten more than some of the experts will ever know.

"Twenty years ago, I was flying Zippers with Ohlsson 19's and Brown 60's," recalls Bill Millice, a watchmaker, from Hamilton, Ohio, "and the same problems arose then that we have today. If the model gets high enough, it will hang in a thermal no matter how heavy it is—even if it is not quite correctly adjusted. Our wing loading, under rules, was 10 ounces per square foot. I was flying an Arrow that weighed almost 30 ounces on 392 sq. in of wing area. I have one now that weighs 15.25 ounces on a Torp .15. It flies no better!

"Bill Gibson, from Hamilton, won Class A at the Nats in '40 or '41, with an Arrow and Class B with a Zipper—a feat never equalled."

And well do we remember sitting with Gibson as he puzzled a third engine change to go for Class C. It was our firm conviction that Gibson would have swept the Nats had he got his Comet .35 job into the air. Gibson (and Beeler, who designed the ship) flew the Arrow in tight left circles. Gibson used a prop one inch bigger than recommended. He got a tight twisting climb and a beautiful transition into glide that took your breath away. A bigger prop on today's high speed engines would make any of these screamers faint dead away. Don't try to load them down! The Arrow was very much like the Zipper, but the pylon was built into the wing and the whole detached from the fuselage. The Zipper, Carl Goldberg's greatest, did only one thing. It climbed up and up. For a couple of years virtually every contest winner, down the line, was a Zipper. You could do a half hour with the paper hanging over the edges—as it did frequently—like untrimmed pie crust. Oh, well, back to Bill Millice, the rascal who distracted us. Bill says to cut motor runs, then cut time from 6 to 4, maybe even 3, minutes and take 3 flights. He favors 5 flights. Mather, incidentally, suggested power loadings of 200, even 300 ounces. Please fellows, the war is over!

Millice has a challenge. Find a Zipper, sez he, and put a Torp .19 up front and watch it bring home the bacon. That it will. Progress, phooie. Say, boy, did you say you had plans of Beeler's Arrow? You want to be swamped? Anyone interested in the Hamilton Club, or the Arrow—Bill, you'll suffer for this—should write Millice, 120 Winston Drive, Hamilton, Ohio.

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► This is a plug, pure and simple. George B. Huntington, who is GBH Accessories, 707 Hoyt St., S.E., Grand Rapids, Mich., has some excellent motor and timer mount accessories that are as ingenious as they are simple. If you'd end the aggravation of mounting many of these engines, such as rear venturi types, and those that require spacers, write the man for his illustrated sheet on nine numbers. These will be widely distributed but right now they are too good to wait for . . . Eastern Canada Open, Gananoque, Ontario, switched to September 16th, instead of 23rd . . . East Bay Radio Controller's Club paper, the Carrier, is doing wonders for local activity, Dale Root (Root's Hobby Hut), reports. Most clubs have such papers so the idea must pay off . . . Mom Robbers really poetic about handling of contest by Monterey Peninsula Balsa Bugs. To the office workers, gardenia corsages for the

(*Continued on page 42*)

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MAN at Work

(*Continued from page 4*)

man from the 30's. Bilgri is a sure threat anywhere, anytime, Montplaisir a shrewd designer and team veteran. In Nordic it was Hartwill, Bob Moulton, Joe Bilgri, Carl Hermes. Carl, also, has been overseas before.

• • •

► The Ann Arbor Airfoilers is a going club with a plan. Exchange Club sponsorship and a nifty control-line field, thanks to the Department of Parks, provide a big boost, says Clarence Mather, secretary. Along with Chicago's Ed Lidgard, Mather was successful exponent of the contest canard, or tail-first, rubber job. Did all right, too, placing second to Joe Elgin in the '51 Wakefield eliminations in the Windy City. Anyway, the Airfoilers began an achievement program which has really paid off in improved performance. This was done by providing goals to shoot for. At each meeting a large chart is displayed showing members listings and ratings' earned. In the winter time, it's indoors in the high school gym—six members even built microfilm jobs. A roving trophy goes to the junior member with highest indoor time. Similar trophies also awarded for outdoor hand launched glider and control line in the summer time. Annual big deal is an Invitational Meet. Don Drury, Pres.; Bill Pearse, VP; Pete Thelan, Treas.; round out the team of officers. (Write Clarence Mather, 1224 Franklin Blvd., Ann Arbor, Mich.).

• • •

► During the no-decision battle over free flight, the ball-point pen mail reached a crescendo. Some very wonderful comments were received from old timers who have forgotten more than some of the experts will ever know.

"Twenty years ago, I was flying Zippers with Ohlsson 19's and Brown 60's," recalls Bill Millice, a watchmaker, from Hamilton, Ohio, "and the same problems arose then that we have today. If the model gets high enough, it will hang in a thermal no matter how heavy it is—even if it is not quite correctly adjusted. Our wing loading, under rules, was 10 ounces per square foot. I was flying an Arrow that weighed almost 30 ounces on 392 sq. in of wing area. I have one now that weighs 15.25 ounces on a Torp .15. It flies no better!

"Bill Gibson, from Hamilton, won Class A at the Nats in '40 or '41, with an Arrow and Class B with a Zipper—a feat never equalled."

And well do we remember sitting with Gibson as he puzzled a third engine change to go for Class C. It was our firm conviction that Gibson would have swept the Nats had he got his Comet .35 job into the air. Gibson (and Beeler, who designed the ship) flew the Arrow in tight left circles. Gibson used a prop one inch bigger than recommended. He got a tight twisting climb and a beautiful transition into glide that took your breath away. A bigger prop on today's high speed engines would make any of these screamers faint dead away. Don't try to load them down! The Arrow was very much like the Zipper, but the pylon was built into the wing and the whole detached from the fuselage. The Zipper, Carl Goldberg's greatest, did only one thing. It climbed up and up. For a couple of years virtually every contest winner, down the line, was a Zipper. You could do a half hour with the paper hanging over the edges—as it did frequently—like untrimmed pie crust. Oh, well, back to Bill Millice, the rascal who distracted us. Bill says to cut motor runs, then cut time from 6 to 4, maybe even 3, minutes and take 3 flights. He favors 5 flights. Mather, incidentally, suggested power loadings of 200, even 300 ounces. Please fellows, the war is over!

Millice has a challenge. Find a Zipper, sez he, and put a Torp .19 up front and watch it bring home the bacon. That it will. Progress, phooie. Say, boy, did you say you had plans of Beeler's Arrow? You want to be swamped? Anyone interested in the Hamilton Club, or the Arrow—Bill, you'll suffer for this—should write Millice, 120 Winston Drive, Hamilton, Ohio.

• • •

► This is a plug, pure and simple. George B. Huntington, who is GBH Accessories, 707 Hoyt St., S.E., Grand Rapids, Mich., has some excellent motor and timer mount accessories that are as ingenious as they are simple. If you'd end the aggravation of mounting many of these engines, such as rear venturi types, and those that require spacers, write the man for his illustrated sheet on nine numbers. These will be widely distributed but right now they are too good to wait for . . . Eastern Canada Open, Gananoque, Ontario, switched to September 16th, instead of 23rd . . . East Bay Radio Controller's Club paper, the Carrier, is doing wonders for local activity, Dale Root (Root's Hobby Hut), reports. Most clubs have such papers so the idea must pay off . . . Mom Robbers really poetic about handling of contest by Monterey Peninsula Balsa Bugs. To the office workers, gardenia corsages for the

(*Continued on page 42*)

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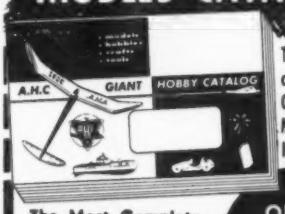

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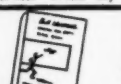

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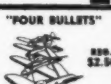

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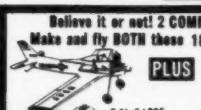

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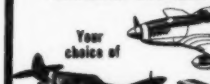

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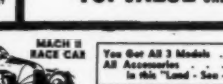

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GIMLET . . .

Low wing RC models have been made before—to be different. This one pays off in performance. For .049.

Looking pleased with the simple-lined but attractive low wing, author travels light with Half A. So what other paraphernalia do you require?

No hatches or surface openings to allow fuel seepage and oil soaked interior. Five different engines tried, Atwood, Holland, right.

Landing gear attaches to wing, features torsion-bar design to take up shocks. Wing knocks off—or you can take it off peaceful like.

By PHIL KRAFT

In the free-flight contest aircraft, flight control is inherent and predetermined by the aerodynamic force layout. Conversely, the radio model should be designed with only a safe minimum of inherent control so the flier can easily make the aircraft do his bidding. With this important distinction in mind, the Gimlet was designed as a low-wing, not for the sake of being different, but rather because this layout seemed to offer the following characteristics sought by the designer:

1. Smooth steady flight with automatic stall recovery, and resistance to ballooning. The high thrust line, well above the center of resistance on the low wing, greatly improves stall resistance and flight smoothness.

2. The ability to circle either right or left, without use of rudder to hold the model in the turn. Here the low-wing's lack of true directional stability becomes an asset.

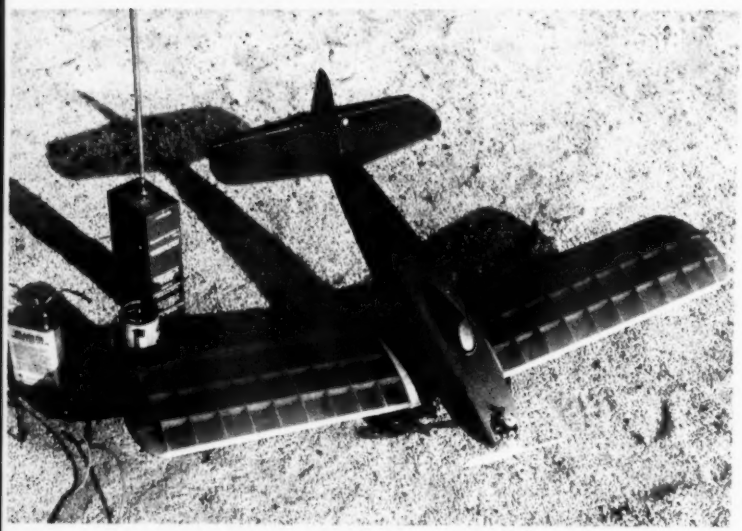
3. Smooth turns without the nose dropping. The center of gravity above the center of resistance helps as it tends to flatten the turn.

4. Smooth take-off and landing characteristics. The low static mass and cushion of air between the wing and runway, along with proper position of the landing gear, insures this.

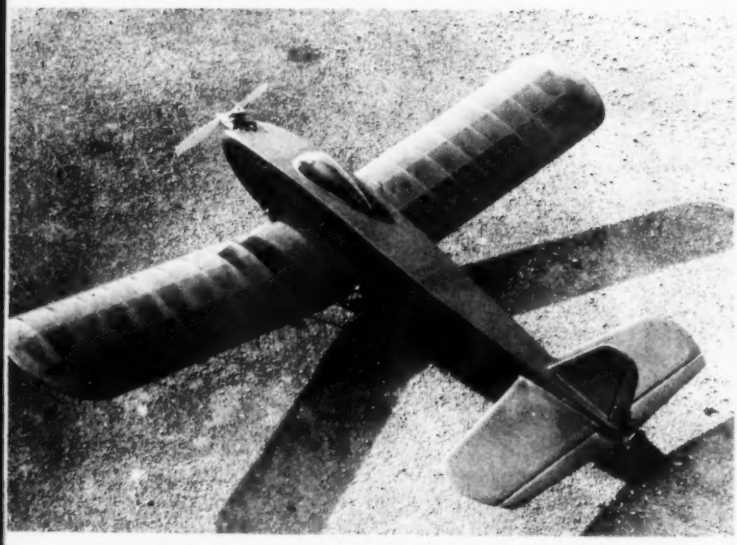
5. Good maneuverability. The center of gravity, being very near the center of lift, insures this characteristic. The model does not roll out of loops and is easily stunted.

Hundreds of test flights on the first Gimlet proved that the model combines all these characteristics with a steadiness and smoothness that would do justice to a much larger and heavier model.

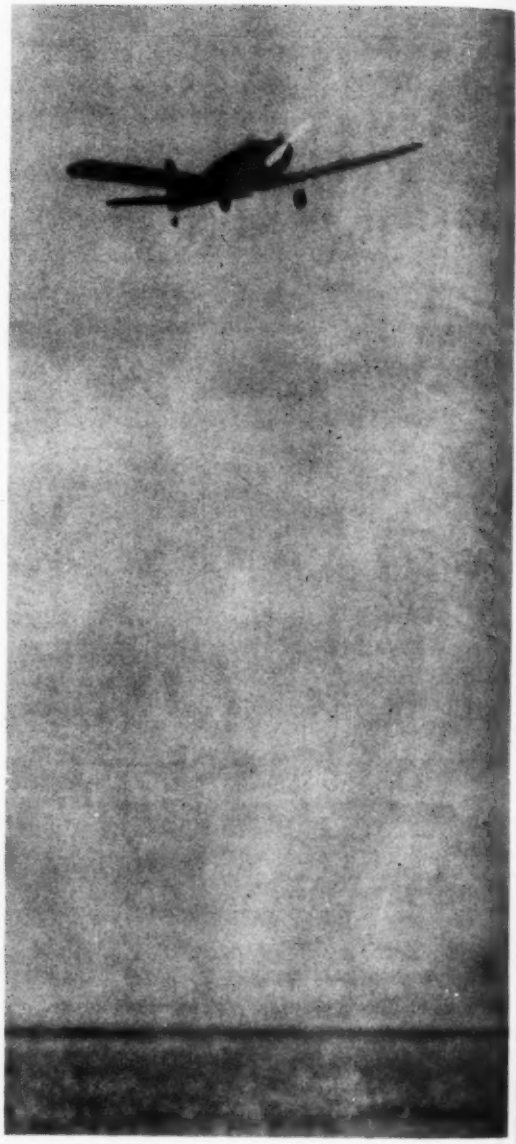
Only minor aerodynamic changes were made in the second version of the Gimlet presented here, but many changes were made structurally and in the layout of the radio gear. As an example, hatches were found to be



If you've ever built a sport free flight, you can make this simple RC. Kick-up elevators from Babcock Mark 2 escapement add a flip.



Oddly enough, box-shaped fuselage is easy on the eye. Scaled up, it would pay to go in for faired top. Low wing should invert well.



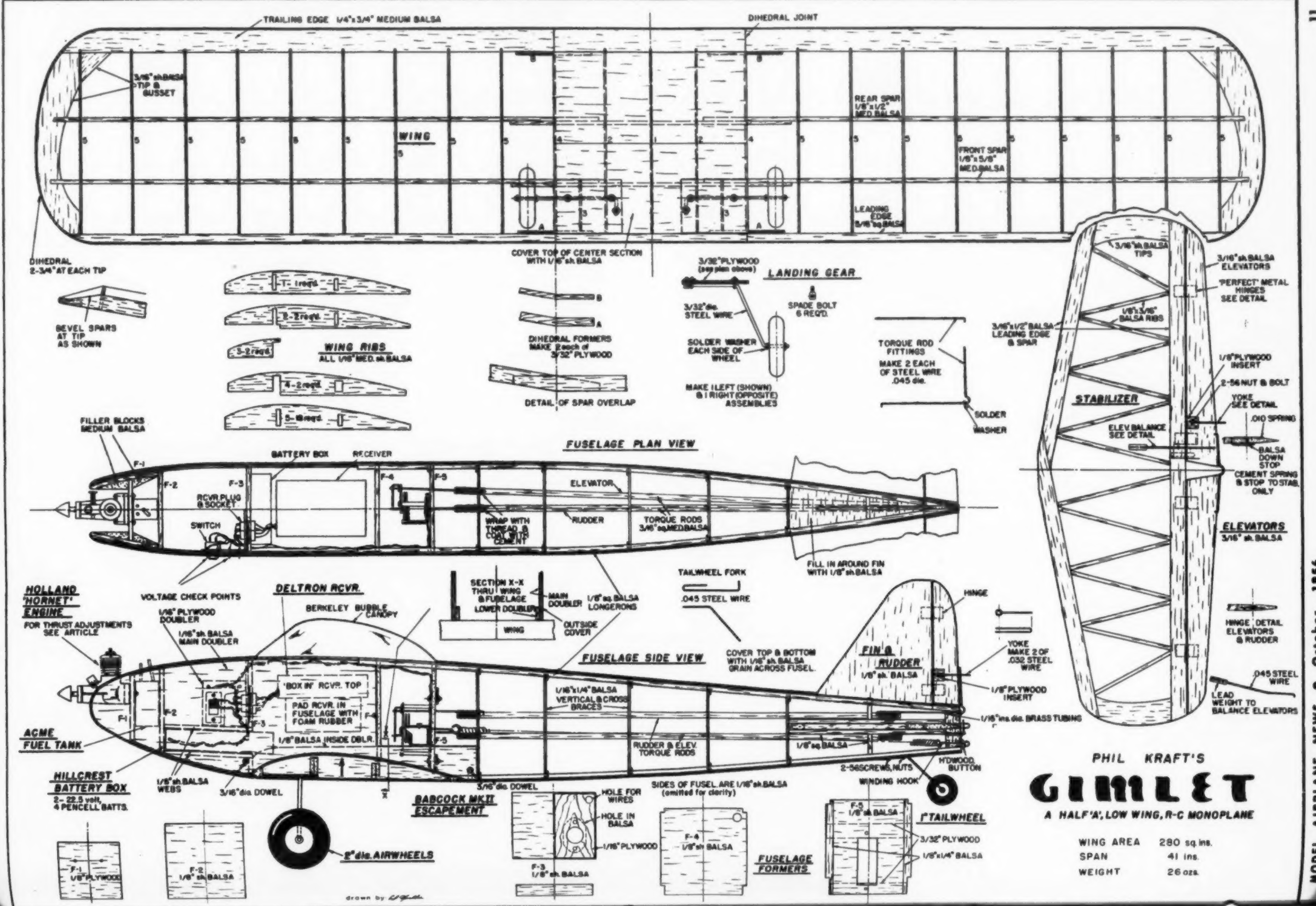
Hundreds of test flights confirmed the designer's concept that a low wing would have many advantages over ultra-stable high wings.

undesirable because they weakened the structure and leaked oil into the fuselage. Consequently, batteries and the receiver are now easily accessible by removing the wing. The Hillcrest battery box slides neatly into its compartment and the receiver is completely protected with foam rubber. The torsion-bar landing gear is rugged but flexible and has created no problem mounted on the wing. The general structure is extremely robust, but with the light radio gear available, weight is not a problem.

Five different engines were tried in the Gimlet, but Bob Holland's Hornet or the Atwood proved to be the most suitable. Those builders who have not tried a kick-up elevator with single channel control are missing a very simple but terrific improvement. With this feature, loops and other maneuvers are much more easily accomplished.

The Babcock Mark II escapement makes the addition of up-elevator simple, and is an absolutely reliable lightweight low battery unit capable of handling large amounts of power, and could be used to actuate the elevator on even very large planes.

Begin construction by tracing the 1/16" sheet fuselage sides directly from the plans, using carbon paper for transfer, and mark the position of all uprights and doublers, etc. Next, trace the 1/16" sheet forward doubler, ⅛" sheet doubler and all bulkheads. Top and bottom of battery compartments are traced from the top view of fuselage. Cement doublers, longerons and uprights in place on fuselage sides. When dry, pin and cement fuselage sides to formers #2, #3, #4 and top and bottom of battery compartment. Then join rear of fuselage with ¼" thick tail block, and front with ⅛" plywood firewall; add all 1/16" x ¼" cross members and install escapement on 3/32" plywood bearers as shown. Add switch, optional battery voltage check points, plug, and complete all wiring at this time. Drill holes for the rear 1/16" tubing torque-rod bearing, and be sure that they are properly alined with the escapement. The torque-rods as assembled outside the fuselage to simplify wrapping the wire to the balsa with thread. The (*Continued on page 49*)



PHIL KRAFT'S

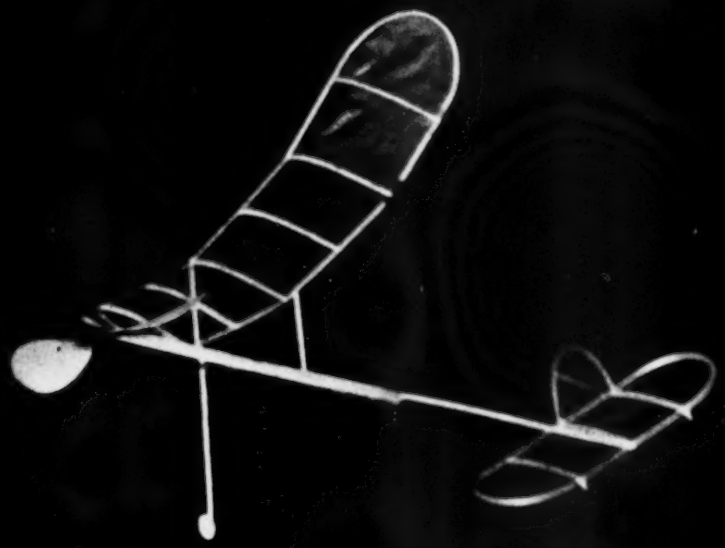
GIMLET

A HALF 'A', LOW WING, R-C MONOPLANE

WING AREA	280 sq.ins.
SPAN	41 ins.
WEIGHT	26 ozs.

FULL SIZE PLANS AVAILABLE. SEE PAGE 52.

fly indoors for FUN!



Circling under 22-foot ceiling is Carl Rambo's Bouncer which is nothing more than traditional ROG (Rise-Off-Ground) with paper covering.

By JOSEPH BILGRI

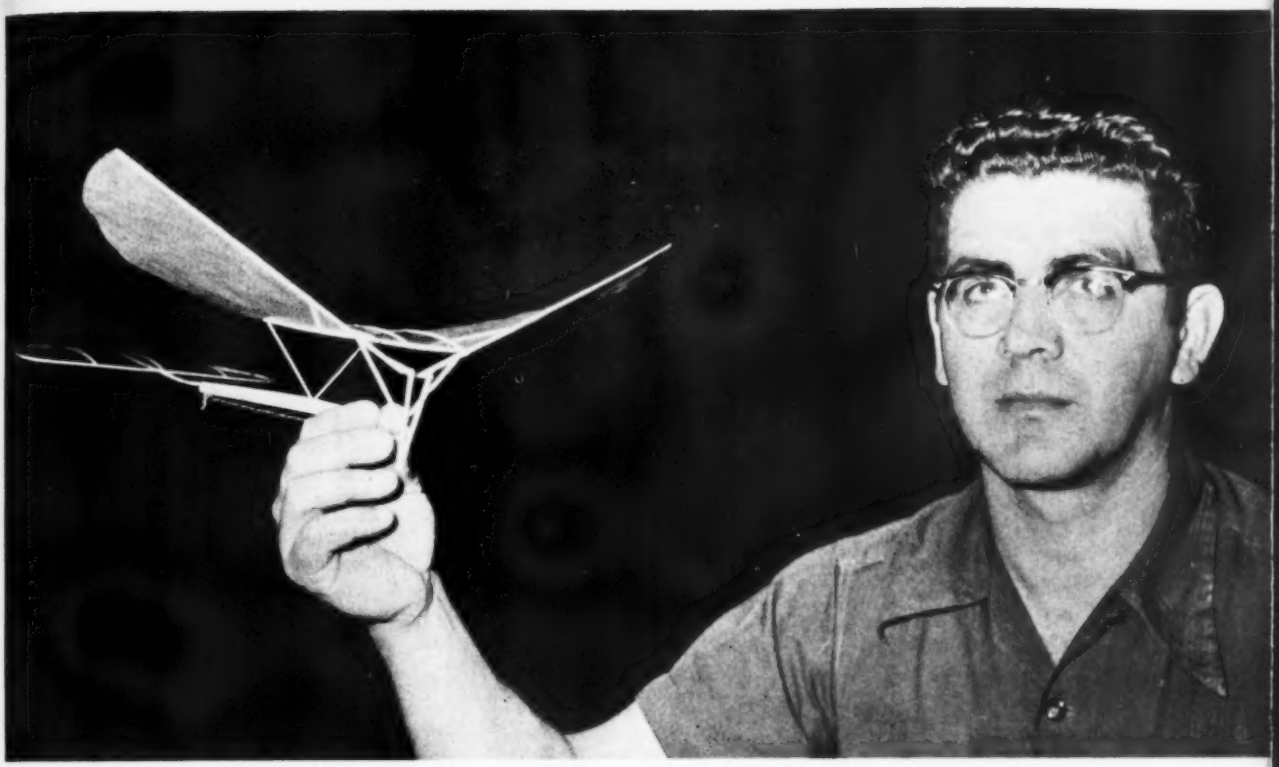
When the last flying field became a housing development, the Oakland Cloud Dusters increased activity many times by using this exciting program. Works anywhere.

Duster President, Glen Spickler, turns lose his balloon buster job.

► Whether or not you live in an area where there is already indoor activity, you don't need a huge building to enjoy indoor flying, and it can be done without using microfilm. For the past four years that our club, the Oakland Cloud Dusters, has been using condenser paper instead of microfilm indoor, activity has increased many times and, out of six different events that are flown regularly, only in the ROG paper covered stick event have the so-called indoor experts been able to win consistently. Small auditoriums, along with their hazards, are great equalizers.

Perhaps your club is having the same trouble ours had about four years ago, when the last of our flying fields became a housing project. The closest available field suitable for contest flying was about 100 miles away. With this situation the active membership started to dwindle until Charles Pottol, who was then president of our club, obtained a small school auditorium for a combination meeting and tissue-covered model contest, which proved to be so popular it has been a regular monthly occurrence ever since, except for the summer vacation period when the schools are closed. From that time on the membership gradually increased, with the majority showing up for each contest with either a model, a stopwatch, or just to watch and heckle the flyers.

General rules were formed for the events flown, with the size of the models kept small enough so they couldn't be destructive. While one loop of ⅛-in. T56 rubber doesn't sound like much power, it's surprising how fast it will power a small speed model. Microfilm wasn't permitted until this past spring when it was allowed in the ornithopter event. Just by replacing the tissue or condenser paper with microfilm on the stab and wing center section, the power needed was cut in half. The best time was raised from 1½ minutes for the all-paper covered ornithopter, to 2 minutes for the microfilm covered one, which



Manuel Andrade, with Flutterer ornithopter—OK, it's a wing flapper. Andrade, Bilgri, have been Internats team, find this fun, too.

isn't too bad a time for a 22 ft. ceiling.

Rules are kept to a bare minimum since the group just flies for the fun of it and, while a small entry fee is charged, no prizes are awarded, the proceeds going into the treasury. The results of the contests and other club events are mimeographed and mailed to all members before each contest or meeting and so, by keeping everyone informed, members are kept interested in the club activities. The six most popular events are described briefly and, if more information is desired on our club's activities or models, please write to the author.

HAND LAUNCHED GLIDERS—I guess that gliders will always be the most popular of all indoor events for gliders are the easiest models to build, the hardest to break and, regardless of the ceiling, are always a lot of fun. Usually, the lower ceilings give the lightest gliders the best chances of winning. For awhile many built-up tissue covered types were tried but the all-balsa ones kept on winning and a built-up glider is seldom seen anymore. Even though the glider's size is limited to 30 sq. in., the sinking speed of the regular gliders has been about 1 foot a second, with the canards sinking slightly faster. The only rules that are used for this event are 30 sq. in. wing area with the stab limited to 50% or less, and no microfilm covered gliders allowed.

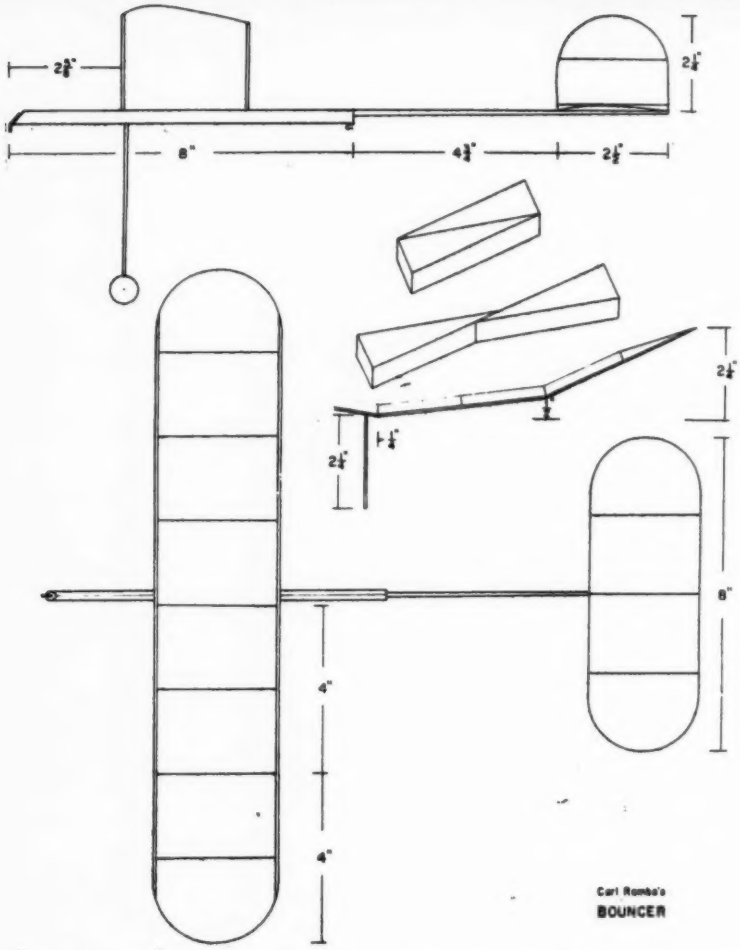
While most of these gliders use a slightly cambered section, formed from light 1/16-in. sheet, Glen Spickler's Loafer, which has been mighty hard to beat in most of the contests, uses light 3/32-in. sheet, which is cupped out by sanding in as much camber as the wood allows. The fuselage is cut from 1/16-in. sheet, and the tail assembly is from light 1/32-in. sheet, which has been sanded to an oversized 1/64th. Joe Foster's Floosie so far has been the best of the canards, and is constructed much the same way as the Loafer, except that the wing is made from 1/16-in. sheet. While we haven't flown canards nearly as much as the regular type gliders, the times made are slightly less also, so there is a lot left to be accomplished with this type. There is no reason that the times for both types shouldn't be equal.

BALLOON BUSTING—In this event the spectators get just about as much fun as do the modelers, for the suspense of whether the model will pop the balloon, even if it hits one, makes the event interesting to everyone. No size limit is placed on the models, but the power is restricted to no more than one loop of ⅛-in. T56 rubber, in order to keep the models from becoming dangerous. All models must ROG and no more than three pins or needles are allowed. The balloons are tied directly to a line at about two-foot intervals, which extends across the auditorium at a height of about 15 feet. If it sounds easy, try it sometime. Many have gone through an evening without popping any balloons but it usually takes more than 20 to win the event. While any type of a small ROG can be used, the all-balsa type such as Glen Spickler's Popit works best due to the extra weight and slightly faster flying speed. This model holds the unofficial club record by popping five balloons in a single flight.

The Popit is constructed from light 1/32-in. sheet balsa, which is used for all four fuselage sides and the tail assembly. The wing and pylon are from light 1/16-in. sheet, with about ⅛-in. of camber formed into the wing when the dihedral breaks are made. The prop is a 6-in. diameter Palowina type, and three needles are used with one on each tip, and one extended from the center of the wing to a position over the prop. The best adjustment is a tight circle and a shallow climb.

ORNITHOPTERS—To me, ornithopters are always fascinating to watch and fly and, while practically all sizes and types have been tried, Charles Bell's Flutterer has been the most outstanding. The forward extension of the

CONTINUED WITH PLANS ON NEXT TWO PAGES

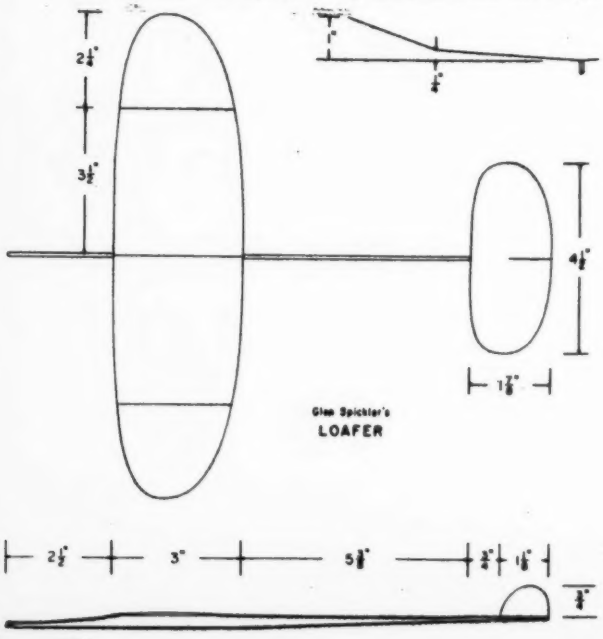


Good, low-ceiling model must circle tightly, bounce off obstructions. Rambo's Bouncer is one of best

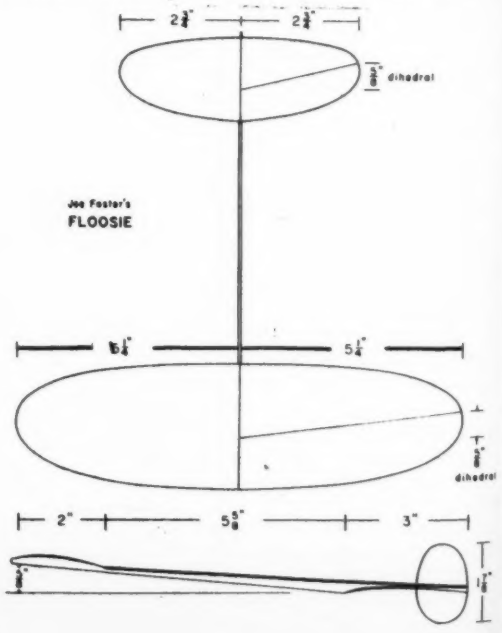
wing hinge, which takes a lot of the flapping shock by twisting slightly, and the high wing mount, make it one of the smoothest flying ornithopters possible.

In building the Flutterer the motor stick is a teardrop shape, and formed around a 3/16-in. dowel from a 1/32 x 1 x 9¾-in. blank. The double bearing from .032 dural with a .015-in. wire crank. The main flapper spar and the push rods are cut from 1/16-in. medium sheet balsa, with the hinge points reinforced by cementing on small pieces of heavy aluminum foil, although several coats of cement skin will make a fair bearing, providing the model is fairly light and not too much power necessary. The center section of the wing has 1/32 sq. ribs with 1/16-in. square, light-balsa, leading and trailing edges and center section supports. The tail boom is cut from 1/16-in. sheet and tapers from 3/32 to about 3/64-in. The stab has 1/32 sq. ribs and the center part of the outline tapers from 1/32 x 3/64-in. at the center to 1/32 sq. at the tips. The center section of the wing and stab are covered with microfilm with condenser paper flappers. Rudders aren't necessary, for circles can easily be adjusted by warping the stab. Power for this model is one loop of 3/32-in. T56 rubber. No special rules were formed for this event in order to get as many members as possible to build whatever they wanted and, while some radical ideas have

Though limited by rules to 30 sq. in., gliders sink one ft. per sec.



Not sure, Foster's Floosie glider goes thataway. Yup, it is canard.

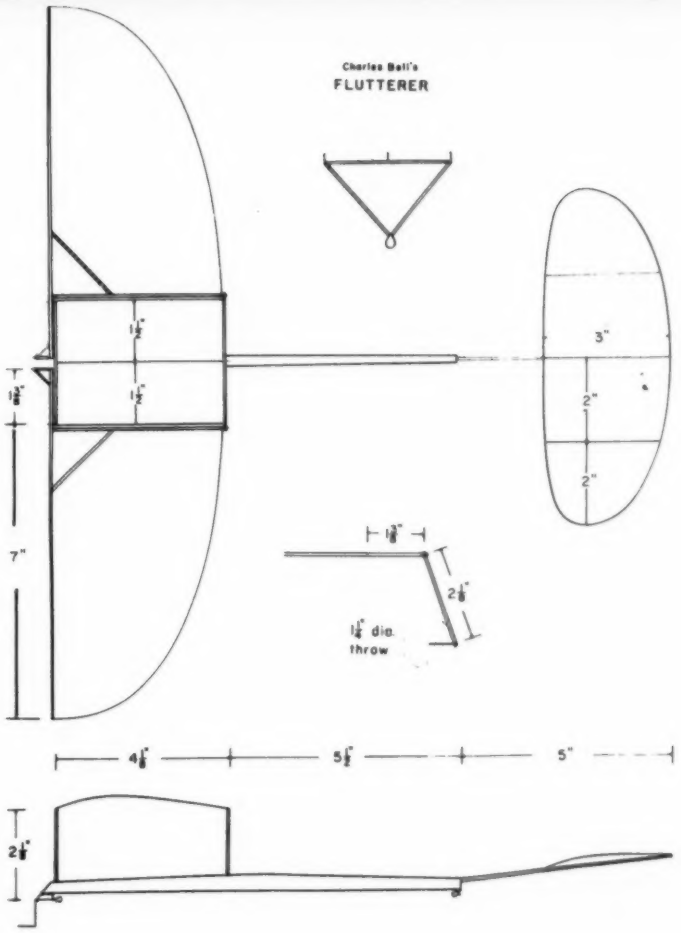


been tried, they so far have had little success.

SPEED—Speed events are always popular and Joe Foster's Flinger is an excellent example of one of these low-powered speedsters. The trickiest part of flying these seems to be in the launch, for everyone tries to give the model a lot of help which often leaves the model heading in the wrong direction.

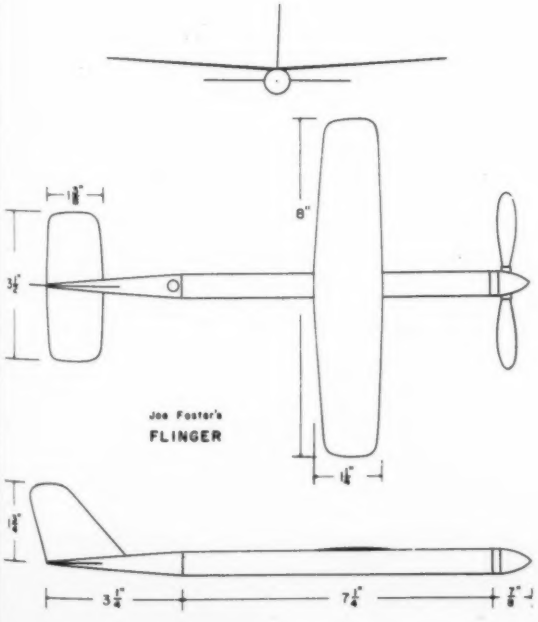
The rules used for the event are as follows: Power—1 loop of ⅛-in. T56 rubber; model must not make more than 1 roll when flying over the length of the course, and the reason for this is to eliminate wingless models; models must hit the curtain at the opposite end of the auditorium, and this is what really makes the contest for, even though the stage curtain covers at least two-thirds of the wall area, it's hard to make some of the speed jobs fly straight and, large as the curtain is, it can be a difficult target.

Construction details of this model are as follows: Fuselage—1/32-in. sheet formed around a ⅛-in. dowel. Wing—Light 1/16-in. sheet with ¼-in. dihedral warped in. Stab and rudder—1/32 in. sheet. Prop—Blades carved from ⅜ x ¾ x 4¼-in. X type block and mounted in paper-tube sockets for adjustable pitch. Power—1 loop of ⅛-in. T56 rubber. Flying adjustments—Slight washing in the left wing panel and a strong follow through launch. Be sure to wind the motor and set the prop for high pitch to cut (*Continued on page* 50)

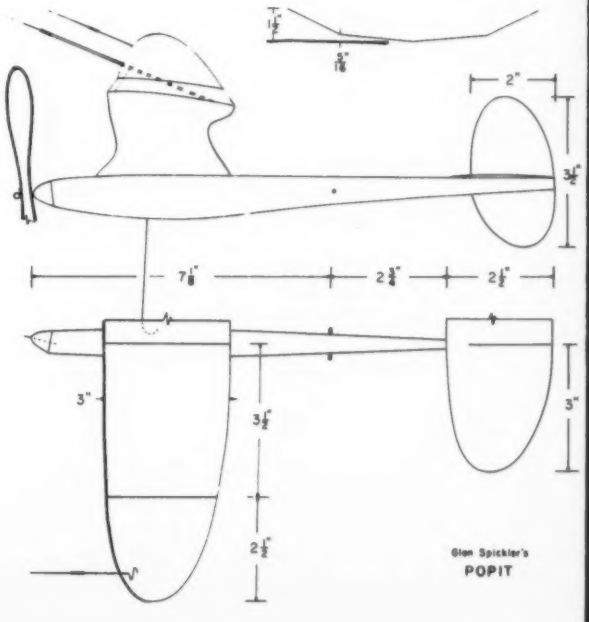


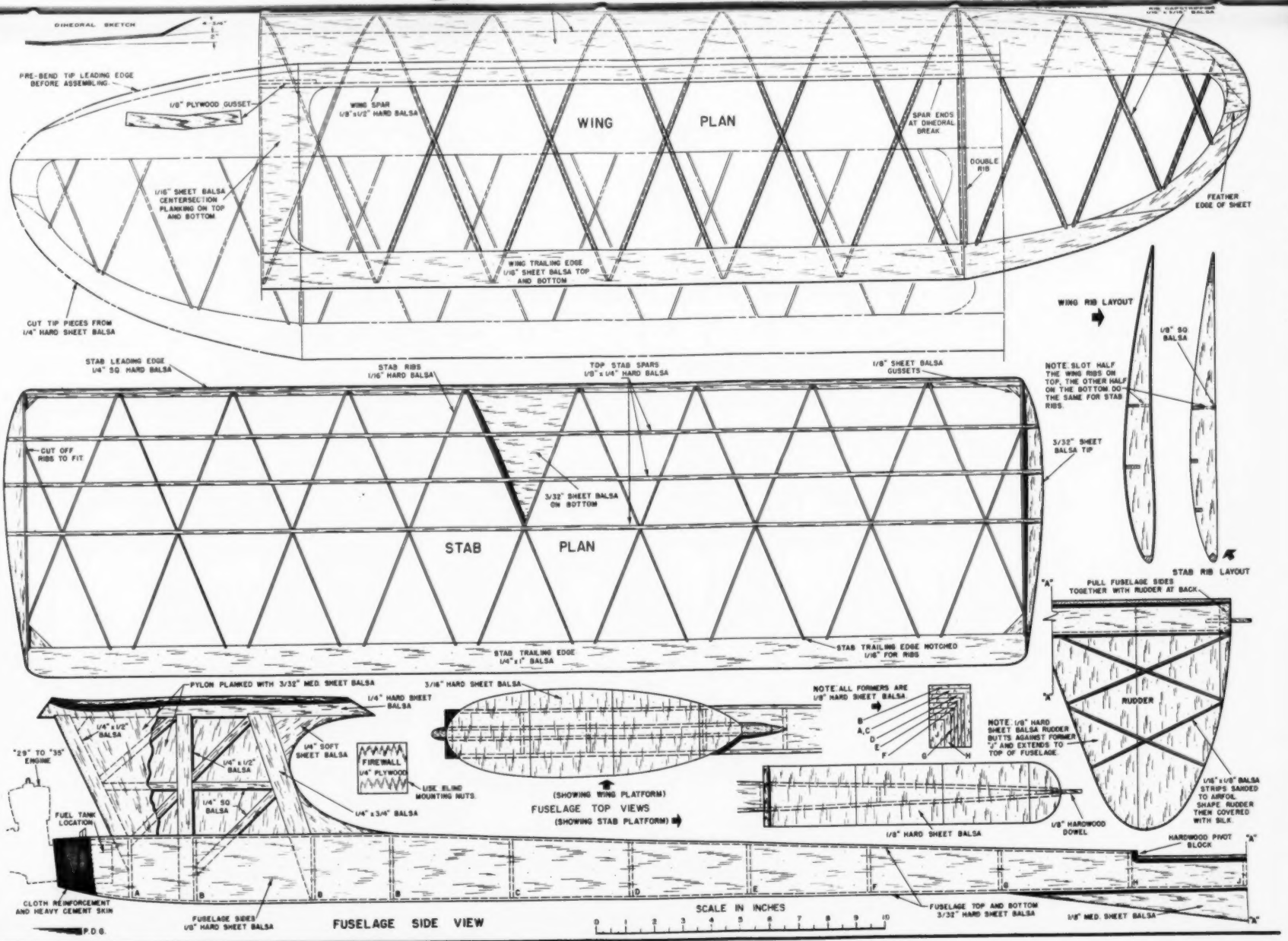
Ball's Flutterer design. This one really flies like a bird. Make it? In flight, it's really noisy bird.

One loop of ⅛ in. rubber powers speed jobs, as Foster's Flinger.



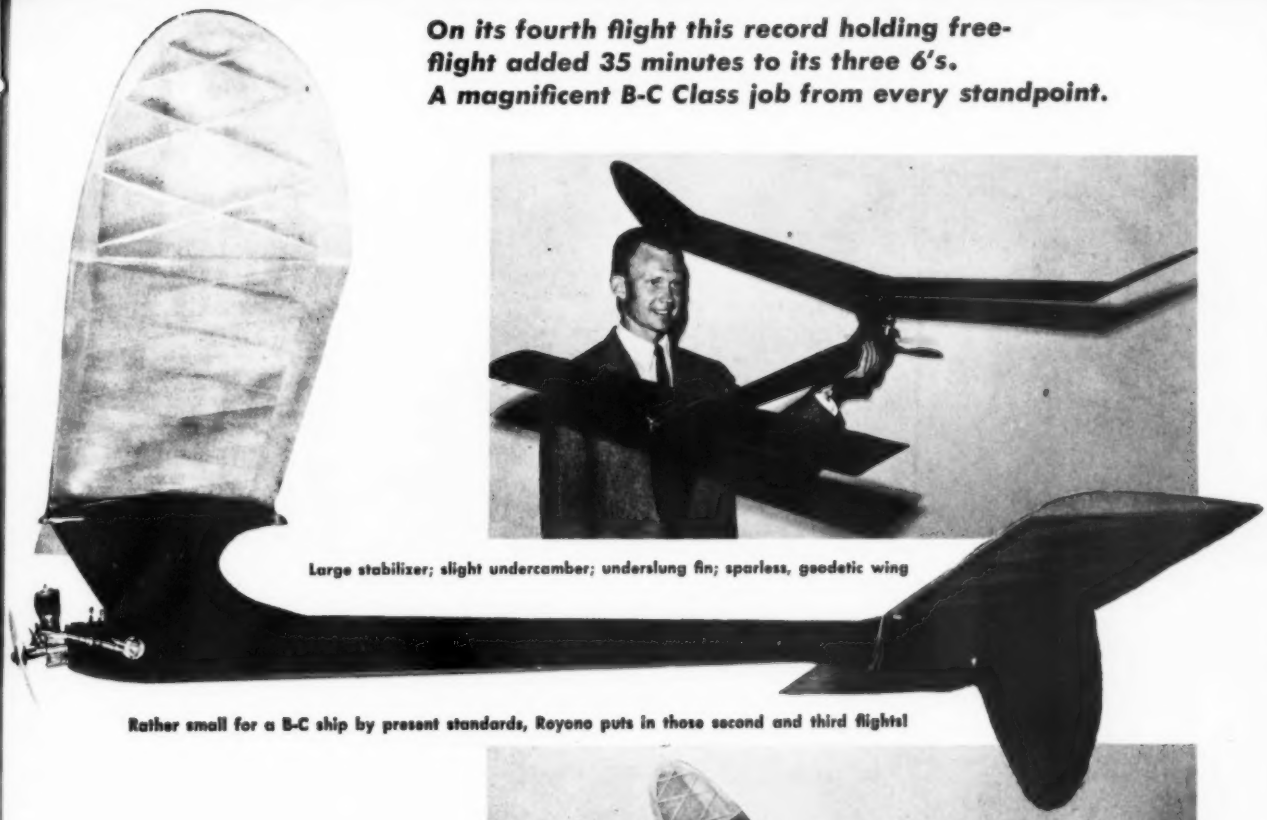
Don't close eyes with this thing around. Spickler's balloon buster.




DIHEDRAL SKETCH
PRE-BEND TIP LEADING EDGE BEFORE ASSEMBLING
1/8" PLYWOOD GUSSET
WING SPAR 1/8"x1/2" HARD BALSA
WING PLAN
SPAR ENDS AT DIHEDRAL BREAK
DOUBLE RIB
FEATHER EDGE OF SHEET
1/16" SHEET BALSA CENTERSECTION PLANKING ON TOP AND BOTTOM
WING TRAILING EDGE 1/8" SHEET BALSA TOP AND BOTTOM
CUT TIP PIECES FROM 1/4" HARD SHEET BALSA
WING RIB LAYOUT
1/8" SQ BALSA
NOTE: SLOT HALF THE WING RIBS ON TOP, THE OTHER HALF ON THE BOTTOM. DO THE SAME FOR STAB RIBS.
3/32" SHEET BALSA TIP
STAB LEADING EDGE 1/4" SQ HARD BALSA
STAB RIBS 1/16" HARD BALSA
TOP STAB SPARS 1/8" x 1/4" HARD BALSA
1/8" SHEET BALSA GUSSETS
CUT OFF RIBS TO FIT
3/32" SHEET BALSA ON BOTTOM
STAB PLAN
STAB TRAILING EDGE 1/4" x 1" BALSA
STAB TRAILING EDGE NOTCHED 1/16" FOR RIBS
STAB RIB LAYOUT
"A"
FULL FUSELAGE SIDES TOGETHER WITH RUDDER AT BACK
PYLON PLANKED WITH 3/32" MED. SHEET BALSA
1/4" HARD SHEET BALSA
3/16" HARD SHEET BALSA
NOTE: ALL FORMERS ARE 1/8" HARD SHEET BALSA
B
A,C
D
E
F
G
H
NOTE: 1/8" HARD SHEET BALSA RUDDER BUTTS AGAINST FORMER "J" AND EXTENDS TO TOP OF FUSELAGE.
1/4" x 1/2" BALSA
"29" TO "35" ENGINE
1/4" SOFT SHEET BALSA
FIREWALL 1/4" PLYWOOD
USE BLIND MOUNTING NUTS
(SHOWING WING PLATFORM)
FUSELAGE TOP VIEWS
(SHOWING STAB PLATFORM)
RUDDER
1/16" x 1/8" BALSA STRIPS SANDED TO AIRFOIL SHAPE. RUDDER THEN COVERED WITH SILK.
1/4" SQ BALSA
FUEL TANK LOCATION
1/4" x 3/4" BALSA
1/8" HARD SHEET BALSA
1/8" HARDWOOD DOWEL
HARDWOOD PIVOT BLOCK
CLOTH REINFORCEMENT AND HEAVY CEMENT SKIN
FUSELAGE SIDES 1/8" HARD SHEET BALSA
FUSELAGE SIDE VIEW
SCALE IN INCHES
0 1 2 3 4 5 6 7 8 9 10
FUSELAGE TOP AND BOTTOM 3/32" HARD SHEET BALSA
1/16" MED. SHEET BALSA
P.D.G.

FULL SIZE PLANS AVAILABLE. SEE PAGE 52.

On its fourth flight this record holding free-flight added 35 minutes to its three 6's. A magnificent B-C Class job from every standpoint.



Large stabilizer; slight undercamber; underslung fin; sparless, geodetic wing

Rather small for a B-C ship by present standards, Royono puts in those second and third flights!

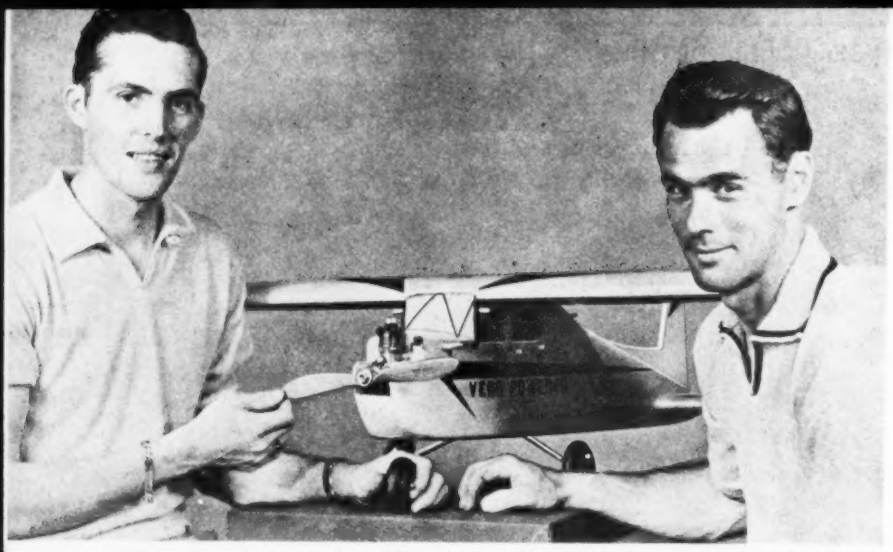
ROYONO

By GARY CHRISTIANSEN

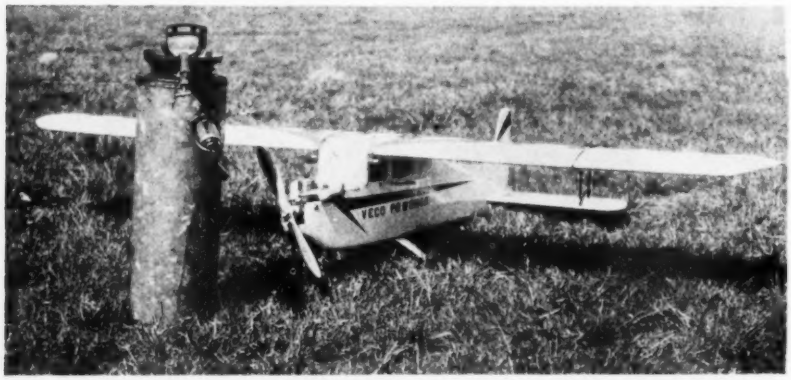
► One might be misled by the Royono's appearance as just another pylon. Of course, a record in itself is not a useful index to the worth of a design, but the Royono has been carefully refined over earlier, very similar, designs and will perform with the most potent ships around if it is decently handled. The improvement has come about partly via actual surgery on the original frame since 1951, when the fuselage shown here was built. Since that time the geodetic structure has been added in a new wing and stab, the nose moment has been shortened twice, the rudder has been moved to the bottom of the fuselage, and the retractable landing gear has been moved out of the way for a VTO set-up. Perhaps the most surprising thing about the facelifting is that the fuselage has come through it in such good condition, for the polish on the four-year old surface was decisive (along with a kind thermal which got the ship mostly above the wind) in keeping the ship in sight on the thirty-five minute fourth flight.

Free flighters will immediately note that at 634 square inches, in spite of the thick Gottingen section and 56% stab, the Royono is a rather small B-C model by current measures. But I suggest that there are advantages in such a ship: it avoids the awkwardness of the outsized B-C model; it allows a more rugged structure without going over weight. Silk-covered and anything but tender, the smaller Royono's selling points are largely of a very practical sort. One need only ask himself how many big, light "six-minute" machines he has seen fail to show back up at the field after their first or second max's to see my point. But thus to stress the ship's ability to take punishment is not to apologize for its *(Continued on page 42)*

24 HOURS OR BUST!



The men, Duane Sanders, left, and Bob Bell, and the machine. In a grueling test of both, the machine still was going strong when, finally, the exhausted team had to toss in the towel.



A 1½ gallon sprayer pumped eight gallons of fuel to engine during flight. Though flight began in schoolyard at midnight, muffler avoided protests. Police used spotlight when a fog rolled in.

By DUANE SANDERS & ROBERT BELL

For a day and a night, the plane droned on to a world endurance mark. Behind the longest flight ever made by model aircraft was a plan. Here is how it operated . . .

► Control-line endurance is a test of both equipment and fliers. Not only does it require the engine and plane to be thoroughly perfected, but the fliers must be in top shape too. Behind a record flight of this type stands infinite preparation and planning.

The idea to try for the endurance record developed in early March, after hearing the endurance mark had been upped to 19 hours by a group of five modelers on the east coast. We immediately decided that, if we did fly for endurance, we would try for no less than 24 hours and use only two pilots for the entire flight, making more of an effort necessary for future record attempts.

Our first important step was to decide what engine we would use. We chose the Veco .35 for a number of reasons; first, with Veco's temperature-controlled clearance, we thought the prolonged heat problem minimized. Next, this engine has a very good fuel level test which would prevent the engine from leaning out excessively as the fuel level dropped in the tank, which in turn meant more free time between refuelings. Also, we have been running Veco's for a number of years and were thoroughly familiar with them.

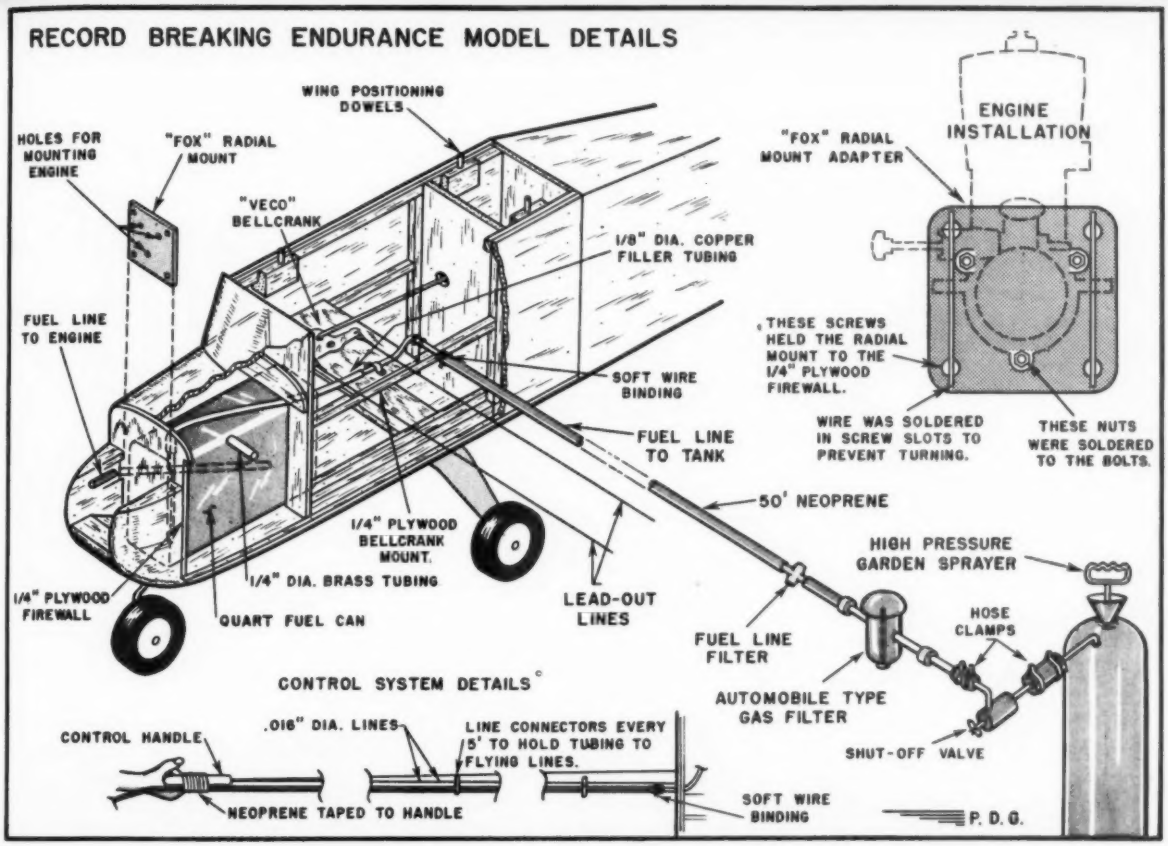
The airplane came next. At first, it was decided to design our own. However, after drawing up the plans, the plane resembled a Live Wire Cruiser so much we decided to use the Cruiser. The plane, however, received a few modifications. The dihedral was removed, the nose lengthened slightly, the stabilizer moved up one inch, and ailerons were added instead of the usual wing weight found on most U-Control models. This was done to reduce total weight, making a better power-to-weight ratio.

The fuel problem was solved easily. A letter to Veco was mailed, giving details of our endurance attempt and asking if they could recommend a fuel formula capable of assuring constant lubrication during the twenty-four hours the engine would be running. A positive reply was had, and at the finish of the flight the engine had as much compression as it did before take-off, proving the effectiveness of the fuel.

The next problem was refueling. The only possible way the plane could be refueled would be by running flexible fuel-line tubing the length of the control lines, and forcing fuel by some means through the line and into the fuel tank. A Sullivan fuel bulb was used at first which, however, proved ineffective.

Medium fuel-line tubing was used as this was felt a good compromise between excessive drag, which would have been caused by the large-diameter tubing, and insufficient capacity caused by the small-diameter fuel line.

With all our ideas mapped out we began construction of the airplane. Construction was easy. However, all cement joints were double cemented and all 90° angle joints were reinforced with ¼ in. square. All this, we felt,


RECORD BREAKING ENDURANCE MODEL DETAILS
WING POSITIONING DOWELS
HOLES FOR MOUNTING ENGINE
"FOX" RADIAL MOUNT
"VECO" BELLCRANK
1/8" DIA. COPPER FILLER TUBING
FUEL LINE TO ENGINE
SOFT WIRE BINDING
FUEL LINE TO TANK
50' NEOPRENE
1/4" PLYWOOD BELLCRANK MOUNT.
1/4" DIA. BRASS TUBING
1/4" PLYWOOD FIREWALL
QUART FUEL CAN
LEAD-OUT LINES
ENGINE INSTALLATION
"FOX" RADIAL MOUNT ADAPTER
THESE SCREWS HELD THE RADIAL MOUNT TO THE 1/4" PLYWOOD FIREWALL.
WIRE WAS SOLDERED IN SCREW SLOTS TO PREVENT TURNING.
THESE NUTS WERE SOLDERED TO THE BOLTS.
HIGH PRESSURE GARDEN SPRAYER
HOSE CLAMPS
FUEL LINE FILTER
AUTOMOBILE TYPE GAS FILTER
SHUT-OFF VALVE
CONTROL SYSTEM DETAILS
CONTROL HANDLE
.016" DIA. LINES
LINE CONNECTORS EVERY 5' TO HOLD TUBING TO FLYING LINES.
NEOPRENE TAPED TO HANDLE
SOFT WIRE BINDING
P. D. G.

Actual refueling operation going on during test flight. Note auto filter and fuel valve partly covered by hand. Plane covered 721.5 miles.

was necessary for 24 hours of vibration which would be hard on regular, single-cemented joints. After the flight, we did not find a loose joint. Metal hinges of the tubing and wire type were used on the stabilizer as we believed cloth hinges would quickly give out. The stabilizer was cemented solidly in place. However, the wing was doweled in place with rubber bands actually holding the wing down.

We mounted a quart fuel can on edge in our plane to serve as our fuel tank and a large-diameter overflow tube was installed in the tank to prevent flooding the engine out during refuelings, with the idea in mind the fuel would overflow easily without causing excessive fuel pressure to the engine. The fuel pick-up tube was located one inch above the bottom and one-half inch from the back of the tank which seemed to work out perfectly. Our filler tube for our gas tank was lead out of the airplane approximately two inches (*Continued on page* 54)

An eye-catching ship, this little Half A proves that the acrobatic design can look like an airplane. Sparless wing helps hold down weight.

the blue-tail fly

By VERN CLEMENTS

Half A stunt jobs usually are sick, overweight, heartbreakers. With a good engine, cowl, this one even beats racers.

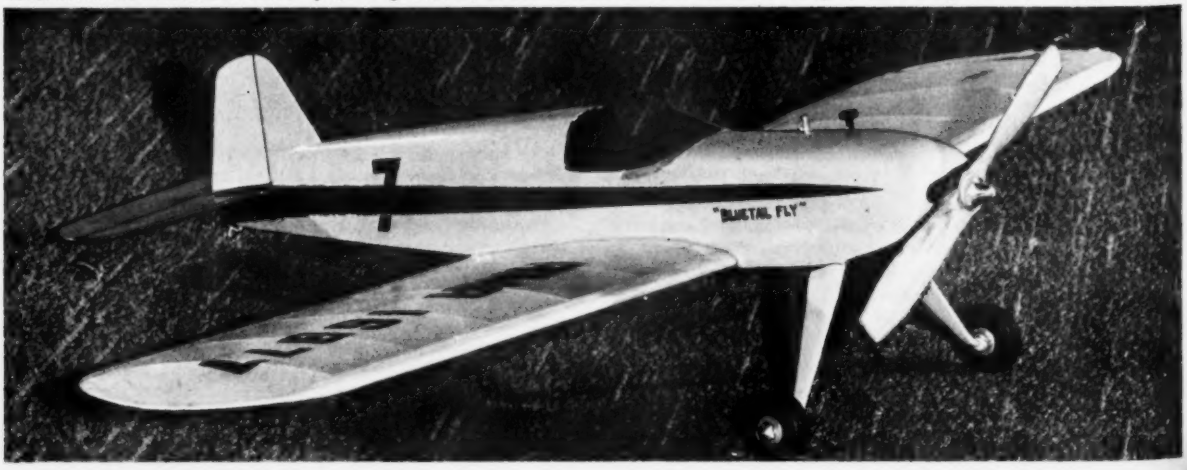
► The Blue-Tail Fly hops off the ground without rolling its wheels, flies fast, and maneuvers in a very lively style. On consecutive stunts, the "Fly" stays on the outside of the circle, pulling enough to give you the feel which is so necessary for smooth maneuvers. When the engine cuts, the glide is flat, the ship rolls to a stop without the usual Half A flip-over.

This performance can be attributed to the light wing and power loading, a fast airfoil, and a longer-than-average stunt moment arm (40 per cent). As well as snappy flying ability, this layout resulted in a very realistic little chap resembling a full scale homebuilt sportplane. Why shouldn't the model look like the real thing?

With the addition of an engine cowl your Blue-Tail Fly can show its tail to most Half A Team Racers. The wing may appear large for racing but the airfoil section is thin and fast, similar to the modern jet plane. Your team race competition fast turning props will also give this ship the edge in fuel mileage.

Begin construction by tracing the fuselage side pattern onto a sheet of medium soft 1/16" balsa, making sure you trace the firewall notches, and mark the former positions at the bottom and top edges for alignment during construction. It is advisable to cut both sides from the

Beneath the smooth exterior lies a simple, strong structure, as can be seen from the detailed drawing by artist Doug Rolfe on the opposite page.



same sheet of balsa which will assure symmetrical curvature of the sides. For accuracy, the two side sheets may be pinned together for cutting to outline and notching for the firewall. This same procedure may be used in cutting out the plywood nose doublers.

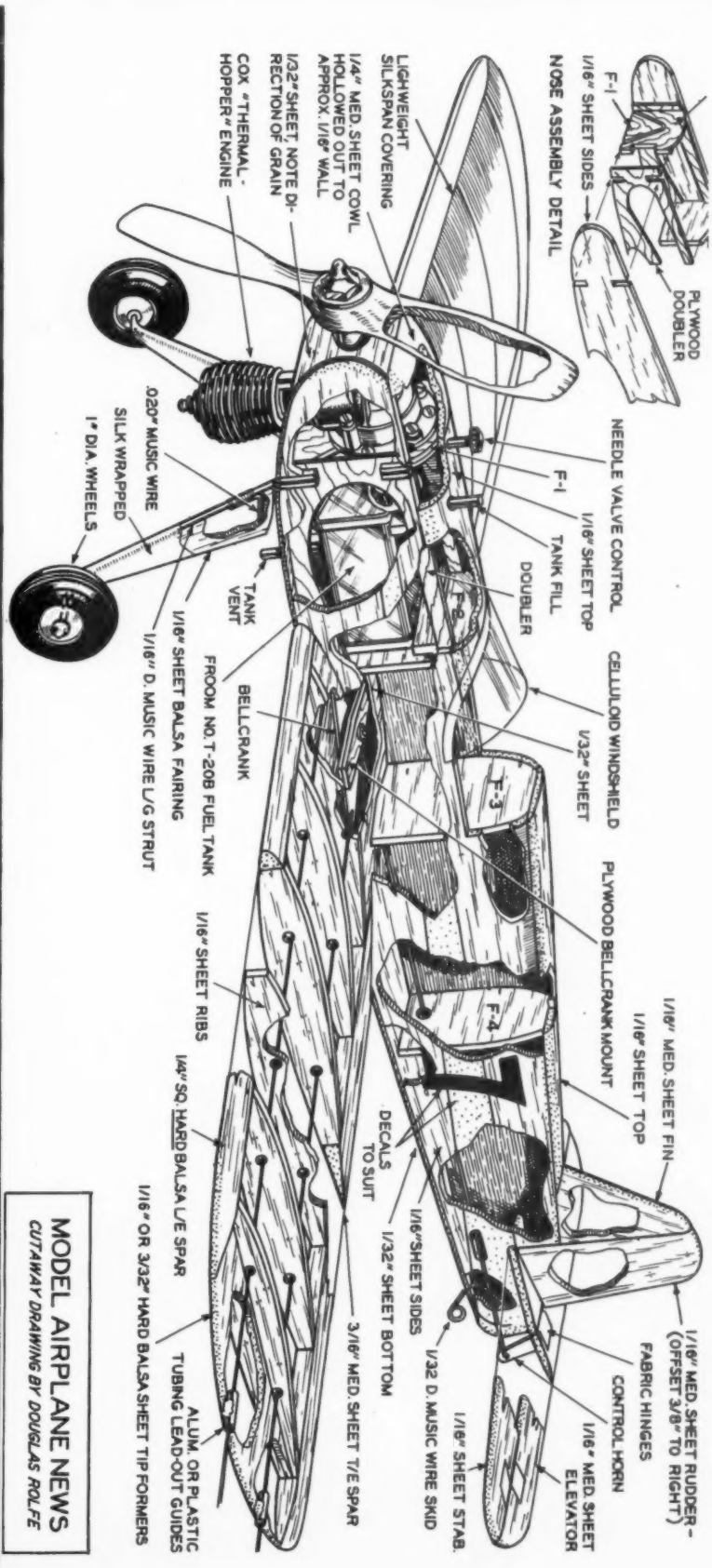
Cement the nose doublers in their proper positions on the side panels. While the cement is drying, the firewall and formers may be traced and cut to size. Two firewalls are shown, one for the Atwood and one for the Thermal Hopper inverted installations. Firewall engine mount holes should be drilled and the landing gear groove carved out before assembly.

Begin fuselage assembly by cementing the firewall into place. Formers #2, #3, and #4 are now cemented into place using pins until the cement sets. Check fuselage top and bottom symmetry while cementing formers in place. The tail sides are cemented together last. Hot fuel proof the engine and tank compartments. The engine, landing gear and tank may now be installed. The tank is held in position by ¼" square sticks well cemented against the tank to the fuselage interior. The tank installation problem may be simplified by using a Firebaby balloon tank, obtainable at your local hobby shop. The balloon tank will give very satisfactory performance and will save weight although a hatch must be cut in the top or bottom for refueling and tank replacement. You are now ready to sheet the top and bottom of the nose section. The engine compartment may be left open on top and bottom, but with a little extra effort the bottom 1/32" sheeting may be dampened and applied with the grain going across. This will allow curving the sheeting around the nose to join a ¼" balsa block cemented above the engine compartment. Cut-outs for engine cylinder and shaft can be accomplished by trial and error.

A wing-rib pattern should be cut from metal or plywood. This pattern can be pinned to the rib stock, for each rib cut-out and block sanded to the pattern edges for accuracy. The leading edge (hard balsa) and trailing edge should be carved and sanded to shape before assembly. The wing tips then are cemented in place. Short pieces of aluminum tubing are cemented to the inside wing tip in their proper positions, per the plans, for the lead-out wires to pass through. We added dihedral for appearance and reinforced the dihedral break with the braces shown on the plans. The dihedral is optional and definitely not necessary.

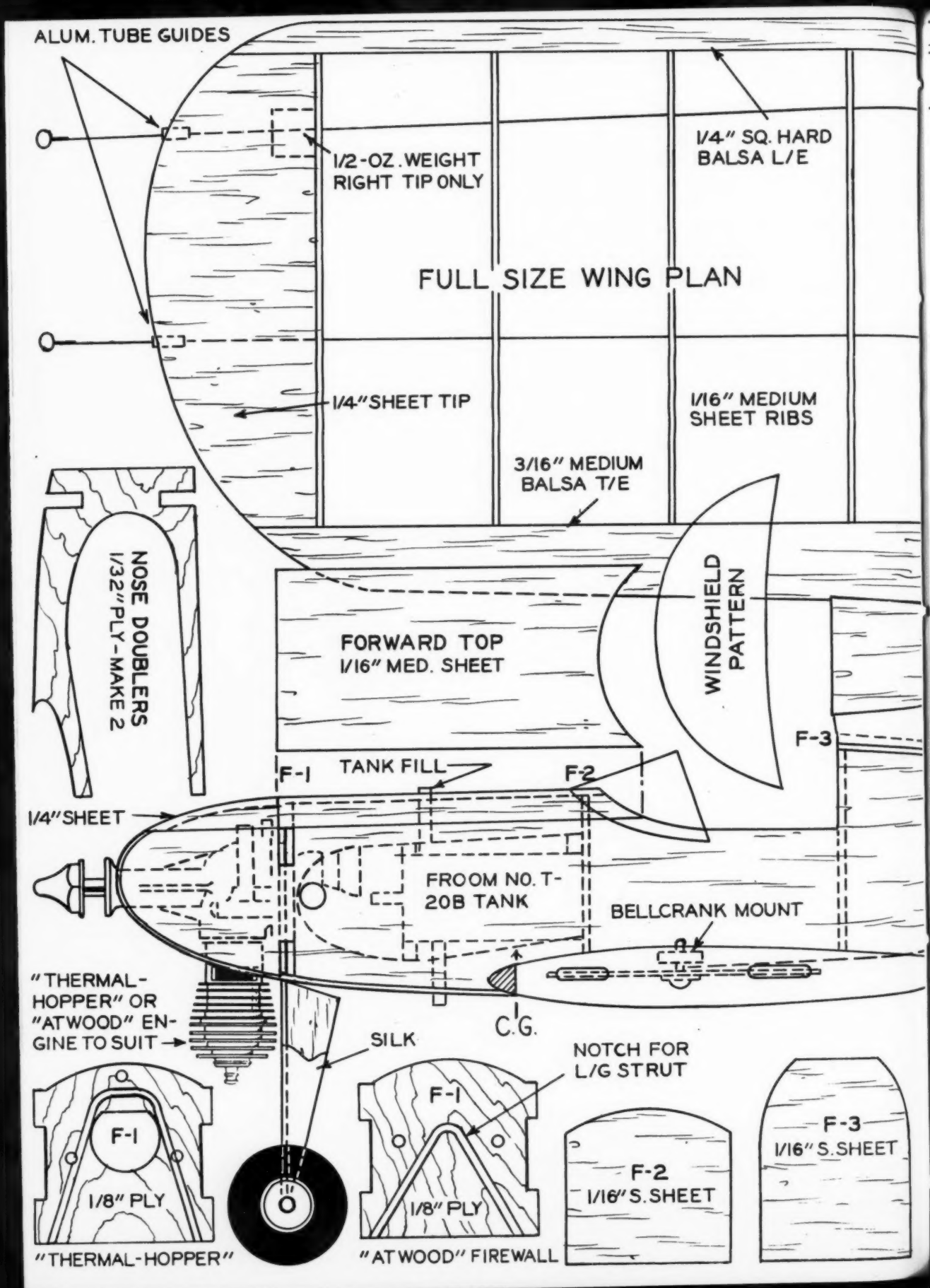
Cut tail (*Continued on page* 50)

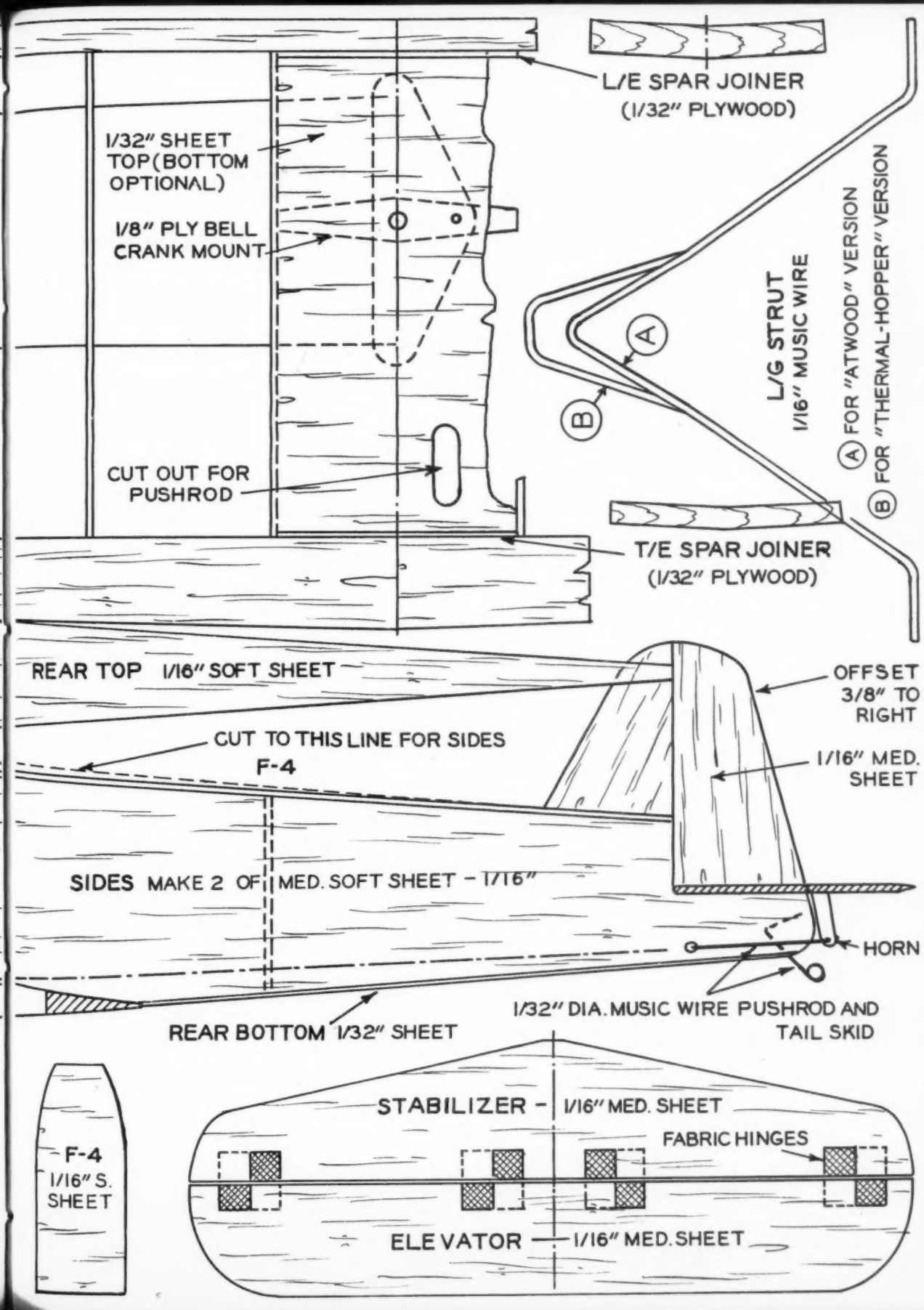
PLANS ON NEXT TWO PAGES



MODEL AIRPLANE NEWS

CUTAWAY DRAWING BY DOUGLAS ROLFE


ALUM. TUBE GUIDES
1/2-OZ. WEIGHT RIGHT TIP ONLY
1/4" SQ. HARD BALSA L/E
FULL SIZE WING PLAN
1/4" SHEET TIP
1/16" MEDIUM SHEET RIBS
3/16" MEDIUM BALSA T/E
NOSE DOUBLERS 1/32" PLY - MAKE 2
FORWARD TOP 1/16" MED. SHEET
WINDSHIELD PATTERN
F-3
F-1
TANK FILL
F-2
1/4" SHEET
FROOM NO. T-20B TANK
BELLCRANK MOUNT
"THERMAL-HOPPER" OR "ATWOOD" ENGINE TO SUIT
C.G.
SILK
NOTCH FOR L/G STRUT
F-1
1/8" PLY
"THERMAL-HOPPER"
F-1
1/8" PLY
"ATWOOD" FIREWALL
F-2
1/16" S. SHEET
F-3
1/16" S. SHEET

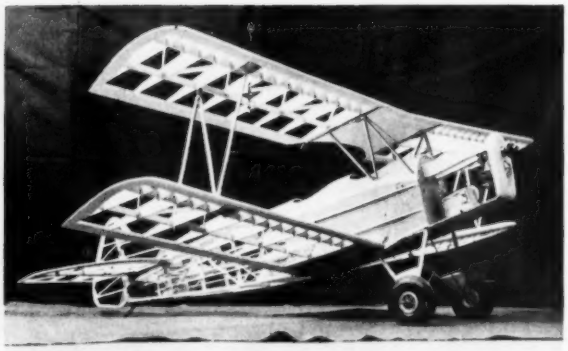

L/E SPAR JOINER
(1/32" PLYWOOD)
1/32" SHEET TOP (BOTTOM OPTIONAL)
1/8" PLY BELL CRANK MOUNT
CUT OUT FOR PUSHROD
L/G STRUT
1/16" MUSIC WIRE
(A) FOR "ATWOOD" VERSION
(B) FOR "THERMAL-HOPPER" VERSION
T/E SPAR JOINER
(1/32" PLYWOOD)
REAR TOP 1/16" SOFT SHEET
OFFSET 3/8" TO RIGHT
CUT TO THIS LINE FOR SIDES
F-4
1/16" MED. SHEET
SIDES MAKE 2 OF MED. SOFT SHEET - 1/16"
HORN
1/32" DIA. MUSIC WIRE PUSHROD AND TAIL SKID
REAR BOTTOM 1/32" SHEET
F-4
1/16" S. SHEET
STABILIZER - 1/16" MED. SHEET
FABRIC HINGES
ELEVATOR - 1/16" MED. SHEET

In 1934, Fred Gale flew prototype of this Travel Air, built from MAN Nieto drawings. Model is stable and has made hundreds of hops.

Radio Control News

By EDWARD J. LORENZ

Kamikazi spot landings, mercury cells, among the numerous topics of discussion, as your push-button columnist reviews all the news, technical developments, reader developments. Gotta be hep to be happy.



RC sure lends itself to scale, witness this well-designed Fleet biplane of another day. In general, biplanes are becoming popular.

► Happy as a Lark could be applied to the LARKS from California, since this group of RC builders and fliers seem to have more fun more of the time than any other group we've heard of. The latest info (Editors of the Lark Newsletter are Bob Coon, 844D 2nd St., Santa Monica, Calif.; and Bob Bowen, 3301 Opal St., Torrance, Calif.) states that Howard Bonner spoke during a meeting of the early days of RC flying, when it was customary to let the ship free-flight up to a safe altitude and then try to bring it back to the same field. The main trouble was unreliable equipment used during the early days. Heavy battery drain of receivers and escapements and poor escapement design were typical of the major troubles. The talk ended with the advice of keeping your escapement clean at all times. Do not allow excess oil to gum the bearings and get on the wiring or electrical contact points. An occasional cleaning with a bit of carbon-tet, applied with an old toothbrush or similar stiff bristle brush, will make for added reliability. The use of carbon-tet for cleaning escapements, relay points, etc., should be done in a well ventilated area, and the liquid should not be allowed to come in contact with your skin. (Editor: The stuff can be quite dangerous to health.) A safer material to use for this purpose is methylene chloride, which has about ½ the toxicity of carbon-tet.

The California boys are shooting for better landings (no pun). "Kamikazi" tactics are frowned upon in order to hit a spot. The LARKS have a most practical method of scoring spot landings. They keep the same spot landing layout and point system but, in addition, use a multiplier factor. For a "Kamikazi" crash landing, this factor is 0, for a bad bounce 1 and, for a smooth landing on the spot, it is 2. A "Kamikazi" attack would gain you nothing, while a perfect landing on a lesser ring would put you ahead on points.

Photos include a ¾ rear view of a Piper Super Cruiser built by E. Kreulen, Binnenweg 135, Rotterdam, Holland. One of the novel features of this plane is the access hatch on the top of the cabin. It is claimed to make for a more rugged ship since there are no doors on the ship. The wings are in two panels, as customary on many European and English models. The control box has a 4-position stick, plus 3 push-buttons. The buttons are used for engine control and chute release. The receiver is a 3-tube tone-actuated unit, measuring 2¼ x 2½ x 3½" and having a filament drain of 150 ma. The relay current idles at zero and rises to 3 ma. upon receipt of a signal. A 1¼ watt input transmitter operates this unit at a distance in excess of one mile. Mr. Kreulen states that this model, of which he has put in a considerable amount of 'home-made' work, including the prop, represents a small fortune in Holland.

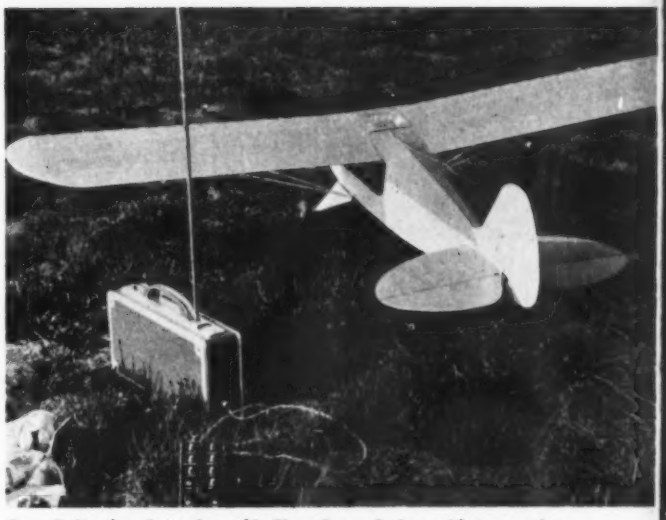
After having mentioned several times that the British and European RC models were typical of the type of models we flew about 15 years ago, we're glad to report that recent photos show a great influx of scale jobs and models along the lines of those being used in this country. However, the "old fashioned" designs often-times had many good features such as large roomy cabins and landing gears that could take a good shock without folding up. Such is progress.

The Kansas City Radio Control Association midsummer, all-RC contest, is now in the books. Rudder-only was taken by M. Hester of Des Moines, Iowa; followed by Dr. R. Clark of Omaha, Neb.; and Dick Arland of Des Moines. The multi-channel event was won by Dick Olson, followed by Temple Stevens of Moberly, Mo.; Ralph Stoltz, Hickman Mills, Mo.; and Bud Adkinson, Blue Springs, Mo. Spot-landing trophy went to Bill Clark of Omaha for coming within 11'5" of the spot. Although there was rain and winds of from 20-30 MPH both days of the meet, the event drew 36 contestants from 5 states, and the total

number of planes was 50. Al Harmon made the most spectacular maneuver of the meet, a flat spin from an altitude of about 800 feet—guess who won the prize for the best crackup of the event? Ace Schoening took the beauty award with a Cessna 172.

It looks like the Selinsgrove, Pa., RC get-to-gether over the Labor Day weekend is going to have some competition from the North Carolina RC boys, with Jim Thrift as Program Chairman. At the flying sessions held at the Preston Glenn airport on June 8th, 9th, and 10th, there were gathered many notables of the RC world. Howard McEntee, Walt Good, Hal deBolt, and Lt. Col. H. M. Bourgeois from the Marine base at Quantico, are just a few who attended. Lou Errington came all the way from near Pittsburgh. Hal deBolt had a 2-channel 27mc outfit that performed quite well. It is interesting to note that the 27mc line was quite long, as usual, and that the fliers on 465, 220, and 50-54mc flew at their own choosing. Seven states were represented and 16mm color film shots were taken of the event. There is quite a bit of scale RC work going on in this group and Dr. Hartness of Sanford, No. Caro. flies a Cruiser, using the 5-channel Schmidt equipment. Parachute dropping is his specialty.

Sheldon Birenbaum, 105 Harding Court, Monrovia, Calif., sends pix of his modified deBolt Rebel. Using only the wing and tail areas and angular settings, Sheldon redesigned the ship construction-wise. Unless you are familiar with models and their flying characteristics, this sort of thing is not generally recommended. (The Rebel flies beautifully as is—ye Ed.) Some of the statistics on this model are as follows: Wing loading 16 oz/sq. ft., Deltron receiver, Babcock transmitter, Bonner multiple escapement, Aristo 2½" air wheels and powered by a



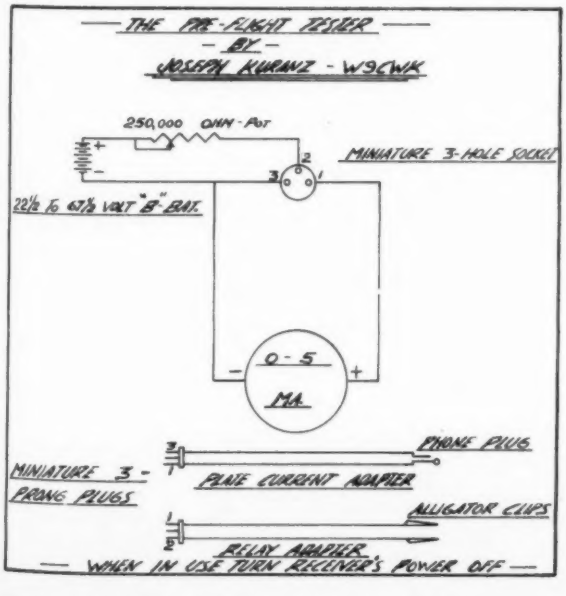
From E. Kreulen, Rotterdam, this Piper Super Cruiser with two-section removable wing panels. Has multi control and a chute release.

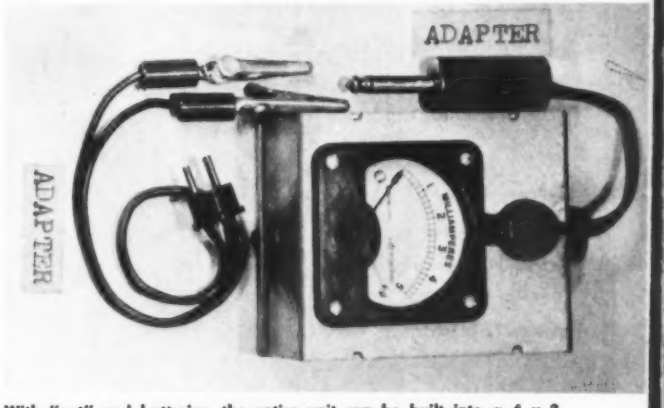
Taifun .09 Diesel engine. This German Diesel, sold by the Wilshire Model Center, Santa Monica, Calif., is just the thing for this size ship. Since the entire engine is cowled in, Sheldon runs the compression screw through a worm gear arrangement to the outside of the plane. Using rudder and engine speed control, this plane made its first 10 flights in perfect order. Being a watchmaker, Sheldon has carried his talents over in doing an excellent construction and finishing job on this model. (*Continued on page* 58)

PRE-FLIGHT TESTER

By JOSEPH H. KURANZ

How is your idle? Current change? Relay operation? Use this checker to find out.





With "pot" and batteries, the entire unit can be built into a 4 x 3 x 2" aluminum interlock box. The two adapters are interchangeable.

► When readying for an RC flying session, the alert modeler makes sure that all equipment is in good working order before leaving for the flying site. The best way to accomplish this is to prepare a check-off list, and check each item, in order to assure that it is ready to perform its job. Such lists have appeared in previous articles and will not be repeated here. However, there are no other tests that should be made just prior to each RC flight, if reliable results are to be expected; the most important of which is checking the plate current ranges, both idling and operating, and of course, just as important, the relay operating ranges, the latter particularly after rough landings. The little test instrument shown above will perform both of these functions. The (*Continued on page* 56)

CURTISS FALCON—THESE TWO PLATES COMPLETE THE

(SHEET NO. 4)

ALL OF THESE AIRPLANES WERE ASSIGNED TO THE MARINE CORPS. ALL PLANES OF THIS TYPE CRAFT SERVED IN NICARAGUAN CAMPAIGN. ALL PLANES OF THIS TYPE TO THE NAVY BY JUNE 1928. 108 CURTISS FALCON TYPE SERVED THE U.S. NAVY.

CURTISS CONQUEROR

THE CURTISS CONQUER WAS USED IN THE D-16, D-39 ETC. AND OTHER MODELS IN WATER OR PRESTONE COOLED VERSIONS. THE ENGINE WAS GEARED TO THE PROPELLER. RATED POWER WAS 600 AT 2400 R.P.M. 5.8 TO 1 COMPRESSION RATIO. THE INSTALLATION OF THE CONQUEROR REQUIRED A WIDER AND HEAVIER FUSELAGE AND HEAVIER ENGINE MOUNT, AS WELL AS A PROPELLER TO ABSORB THE POWER.

LOWER WING

(LEFT SHOWN- RIGHT SIMILAR)

PLYWOOD COVERING TOP AND BOTTOM SURFACES
STRUCTURAL SOLID WEB WING RIB
AILERON PUSH PULL TUBE
STEEL TIE ROD
CLEVIS TYPE WING ATTACHMENT FITTING
DURALUMIN DRAG STRUT
DURALUMIN COVERED LEADING EDGE
LOWER WINGS WERE INTERCHANGEABLE ON ALL MODELS
STRUT POINT FITTING
BELLCRANK ASSEMBLY
FLEXIBLE TRAILING EDGE WING RIB
CANTED DURALUMIN AILERON RIB
RIGID DURALUMIN TRAILING EDGE
STRUCTURAL RIB
CLEVIS HINGES WITH CONTINUOUS HINGE PIN
FABRIC COVERING
INSPECTION WINDOW
STRUT POINT FITTING
TAPE TO STABILIZE WING RIBS

HORIZONTAL TAIL

(ALL MODELS EXCEPT O1-6 AND O-39)
(SPAN ON O-11 WAS 12'-10")

ELEVATOR CONTROL HORN
DURALUMIN COVERING
RIVETED JOINTS
DURALUMIN ELEVATOR STRUCTURE FABRIC COVERING
RIGID TRAILING
MAIN ELEVATOR SPAR (DURALUMIN TUBE)
DURALUMIN HORIZONTAL STABILIZER STRUCTURE FABRIC COVERING
OVAL STEEL TUBE LEADING EDGE
FORMER RIB
DURALUMIN RIB (SOLID WEB)
FUSELAGE ATTACHMENT FITTING
AIRPLANE CENTERLINE

CENTER SECTION AND OUTER WING

EQUIVALENT MONOPLANE ASPECT RATIO 4.67
TAPE TO STABILIZE WING RIBS
CANTED DURALUMIN AILERON RIB
RIGID DURALUMIN TRAILING EDGE
STRUCTURAL RIB
CLEVIS HINGES WITH CONTINUOUS HINGE PIN
FABRIC COVERING
CENTER SECTION WAS INTERCHANGEABLE ON ALL MODELS
CENTERLINE OF AIRPLANE
FLEXIBLE TRAILING EDGE
FABRIC COVERED WOODEN WING STRUCTURE
FABRIC STITCHED AND TAPED TO WING RIBS
SOLID WING RIB
HANDGRIP
INSPECTION WINDOW
RIGID TRAILING EDGE
WING RIB
STRUCTURAL SOLID WEB WING RIB
CLEVIS TYPE WING ATTACHMENT FITTING
ADJUSTABLE STEEL TIE ROD
DURALUMIN DRAG STRUT
FABRIC COVERING
DURALUMIN COVERED LEADING EDGE

WING RIB

(STRUCTURAL MAD SOLID WEB)
(SIMILAR RIB TRUSS CONFIGURATION FOR TOP AND BOTTOM WINGS)

ROUTED WEB SOLID SPRUCE WITH BIRCH PLYWOOD COVERS
DURALUMIN COVERED LEADING EDGE
ALUMINUM ALLOY DRAG STRUT
BIRCH CAP STRIPS
STEEL FITTING
SPRUCE LEADING EDGE
F.S.
R.S.
DURALUMIN TRAILING EDGE
DURALUMIN
ROUTED SPRUCE WING SPAR SPRUCE PLYWOOD WEB
WARREN TRUSS RIB TRUSS
GLUED AND NAILED JOINTS

NAVIGATION LIGHT PAD
INSPECTION WINDOW
WING RIB
RIVETED JOINT
DURALUMIN RUDDER STRUCTURE FABRIC COVERING
RIVETED FITTING
CLEVIS TYPE HINGE WITH CONTINUOUS HINGE PIN
BRACE TUBE
SOLID RIB
RIGID TRAILING EDGE
STREAMLINE DURALUMIN STRUT
TAPE
RUDDER CONTROL HORN
TAIL POST END FITTING
RUBBER DISC COMPRESSION TYPE SHOCK ABSORBER TIE-DOWN RING
TENSION SPRING TAIL SKID STEERING CABLE
RIVETED STEEL FITTING
AMMUNITION RACKS FOR 600 ROUNDS CALIBER-30.

LEFT OUTBOARD PANEL SHOWN-RIGHT PANEL IS SIMILAR)
ADJUSTABLE END FITTING
DURALUMIN VERTICAL STABILIZER STRUCTURE-FABRIC COVERING
TUBULAR BRACES
STREAMLINE WIRE BRACE
CABLE ACTUATED WORM DRIVE HORIZONTAL STABILIZER TRIM MECHANISM
ELEVATOR CONTROL CABLES
PULLEY
DURALUMIN TURTLEDECK
FLEXIBLE M.G. RING
RADIO AMPLIFIER
TIE BRACE
RING TYPE GUN SIGHT
LEATHER COAMING
INSTRUMENT PANEL (SEE SHEET NO 1)
EJECTION CHUTE
GUN CHARGER

CURTISS TYPE D-18 DIRECT DRIVE WATER COOLED ENGINE
HEADER AND WATER EXPANSION TANK
CURTISS-REED FORGED ALUMINUM ALLOY PROPELLER
SPECIAL PROPELLER HUB
FLEXIBLE CONTROL TO RADIATOR SHUTTERS
DURALUMIN SPINNER
OIL TEMPERATURE REGULATOR ON D-18 AND CONQUEROR ENGINES
ADJUSTABLE RADIATOR SHUTTERS (NONE ON PRESTONE COOLED ENGINES)
CARTRIDGE TYPE BRASS CORE RADIATOR
DURALUMIN RADIATOR FAIRING REMOVABLE IN SECTIONS
FUEL FILLER
FIXED M.G. BLAST TUBE
CARBURETOR AIR INDUCTION
OIL FILLER
DETACHABLE WELDED STEEL ENGINE MOUNT
RUBBER DISC COMPRESSION TYPE SHOCK ABSORBER
ENGINE OIL TANK
MAIN FUEL TANK
STREAMLINE STEEL TUBE STRUTS
MECHANICAL BRAKES
STEEL TUBE AXLE
M.G.
PILOT
OBSERVER
RADIO EQUIPMENT
CAMERA BAY
OIL
FUEL
AUXILIARY FUEL TANK (BRAZED BRASS)
BRAKE ACTUATING CABLE
JOYSTICK
RUDDER PEDAL
TRUNNION
BRAKE LINK FAIRING
ENGINE CONTROLS
BULKHEAD
PARACHUTE FLARE CHUTE
FOLDING SEAT
RUDDER CONTROL CABLES
JOYSTICK SOCKET
RUDDER PEDAL
HORIZONTAL STABILIZER TRIM CONTROL CHAIN AND SPROCKET
DURALUMIN SEAT
JOYSTICK TORQUE TUBE

THE RESERVE FUEL ON EARLY MODELS WAS 18 GALLONS. ON MODELS O-13C AND O-2A, 19 GALLONS FUEL RESERVE WAS CARRIED. FUEL WAS SUPPLIED TO ENGINE BY ENGINE-DRIVEN FUEL PUMP. AN EMERGENCY WOBBLE TYPE HAND PUMP WAS ALSO SUPPLIED.

RADIO EQUIPMENT CONSISTED OF THE FOLLOWING
RADIO CONTROL UNIT BC-119
RECEIVING TUNER BC-115
INTERPHONE CONTROL BC-123
RADIO TRANSMITTER BC-118
RADIO AMPLIFIER

A-3 TYPE BOMB RACK ATTACHABLE AT FUSELAGE STATIONS 3 AND 4. FIVE 25 LB. BOMBS OR TWO 182 LB BOMBS BEING CARRIED ON ATTACK MISSIONS

THE FORWARD MACHINE GUN WAS CALIBER-30 AND BORE SIGHTED WITH AIRPLANE IN THE LEVEL FLIGHT ATTITUDE. IT WAS MANUALLY CHARGED BY THE PILOT BUT ELECTRICALLY SYNCHRONIZED TO FIRE THROUGH PROPELLER. 300 ROUNDS CALIBER-30 AMMUNITION WERE SUPPLIED. THE AMMUNITION WAS CARRIED IN A LINK SERIES OF CLIPS WHICH WERE DISCHARGED OUT OF THE EJECTION CHUTE ON RIGHT SIDE OF FUSELAGE. TRIGGER WAS ON TOP OF JOYSTICK (BUTTON TYPE)

INBOARD PROFILE

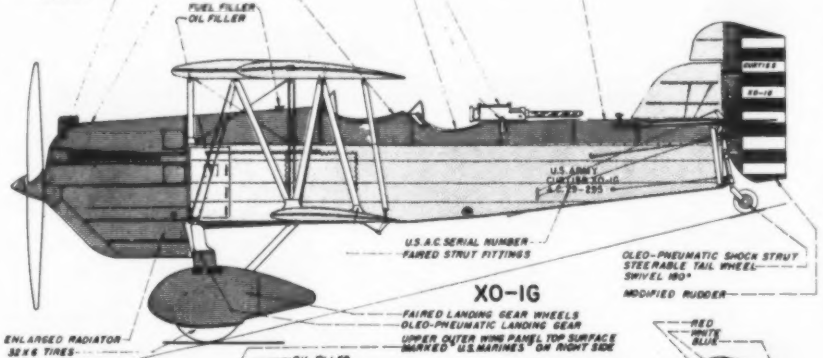
DESIGN NOTES

(I) MODEL XO-1 AND EARLY PRODUCTION AIRPLANES HAD WIRE SPOKE WHEELS WITH FAIRINGS
(2) RADIO EQUIPMENT WAS NOT CARRIED WHEN CAMERAS WERE INSTALLED IN CAMERA BAY.
(3) BROWNING TYPE-FIXED TYPE)
HILLEMIS TYPE-FLEXIBLE GUN.
(5) ON XO-11 AND O-11, A WATER TANK WAS INSTALLED AND FILLED TO OFFSET WEIGHT OF THE HEAVIER LIBERTY ENGINE
(6) A 12-VOLT STORAGE BATTERY WAS CARRIED AS OPTIONAL EQUIPMENT
(7) OIL CAPACITY 14 GALLONS MAXIMUM BUT FILLED TO 8 GALLONS NORMAL WHEN RESERVE TANK IS CARRIED, 19 GALLONS.
(8) FUEL CAPACITY 113 GALLONS
(9) FUEL CAPACITY 56 GALLONS
(10) SIDE INTERIOR OF OBSERVER'S COCKPIT LINED WITH SHEET DURALUMIN
(11) O-11 HAD ASH ENGINE BEARERS TO DAMPEN VIBRATION. NO OIL TEMPERATURE REGULATOR WAS PROVIDED ON LIBERTY ENGINE.
(12) THE ORIGINAL PROTOTYPE XO-1 WON THE U.S. ARMY AIR CORPS DESIGN COMPETITION IN 1924.

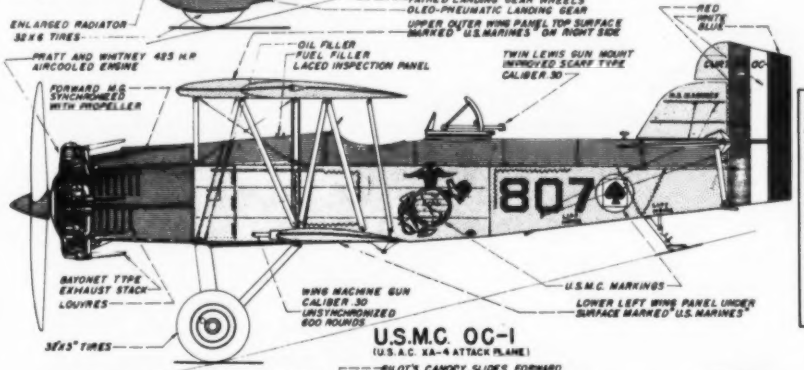
(DRAWN FOR MODEL AIRPLANE NEWS BY WILLIS L NYE)

(SHEET NO 3)

STUDY OF OLD ARMY CORPS OBSERVATION FAMILY.


MODIFIED ENGINE COWL AND PROPELLER SPINNER
RAISED PILOT'S SEAT
LOWERED GUNNER FIRING POSITION
IMPROVED RECESSED FLEXIBLE AFT GUN MOUNT BROWNING TYPE MACHINE GUN CALIBER-30
MODIFIED TURTLE DECK
CURTISS D-12 ENGINE 435 H.P.
FUEL FILLER
OIL FILLER
U.S. ARMY CURTISS XO-1G A.C. 29-295
U.S.A.C. SERIAL NUMBER
FAIRED STRUT FITTINGS
OLEO-PNEUMATIC SHOCK STRUT STEERABLE TAIL WHEEL SWIVEL 180°
MODIFIED RUDDER
FAIRED LANDING GEAR WHEELS
OLEO-PNEUMATIC LANDING GEAR
UPPER OUTER WING PANEL TOP SURFACE MARKED "U.S. MARINES" ON RIGHT SIDE
ENLARGED RADIATOR
32 X 6 TIRES

XO-1G



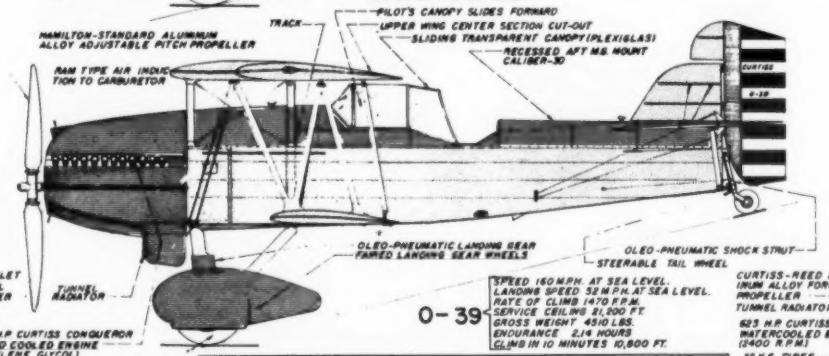
U.S.M.C. OC-1

(U.S.A.C. XA-4 ATTACK PLANE)

THE CURTISS O-11 WAS POWERED WITH REBUILT W.W.I. ENGINES AND WAS ISSUED TO THE NATIONAL GUARD. THIS AIRPLANE HAD GOOD PERFORMANCE. INDIVIDUAL WEIGHTS AS FOLLOWS:

WINGS	484
TAIL	63
FUSELAGE	878
LANDING GEAR	165
ENGINE	1398
PROPELLER	99
EQUIPMENT	93
USEFUL LOAD	1578
ARMAMENT	233

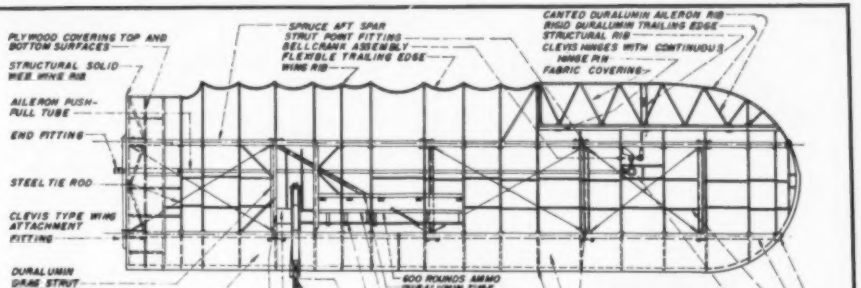
THE CURTISS O-1 WITH THE D-12 ENGINE WAS LIGHTER IN WEIGHT.


HAMILTON-STANDARD ALUMINUM ALLOY ADJUSTABLE PITCH PROPELLER
TRACK
PILOT'S CANOPY SLIDES FORWARD
UPPER WING CENTER SECTION CUT-OUT
SLIDING TRANSPARENT CANOPY (PLEXIGLAS)
RECESSED AFT M.G. MOUNT CALIBER-30
RAM TYPE AIR INDUCTION TO CARBURETOR
OLEO-PNEUMATIC LANDING GEAR
FAIRED LANDING GEAR WHEELS
OLEO-PNEUMATIC SHOCK STRUT
STEERABLE TAIL WHEEL
AIR INLET TO OIL COOLER
TUNNEL RADIATOR
625 H.P. CURTISS CONQUEROR LIQUID COOLED ENGINE (ETHYLENE GLYCOL)
32 X 6 TIRES

O-39

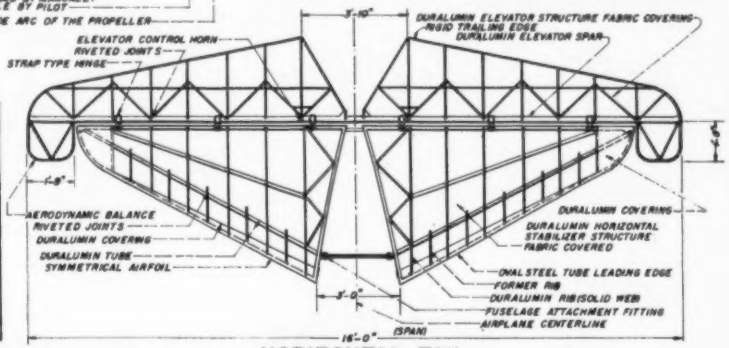
SPEED 160 M.P.H. AT SEA LEVEL.
LANDING SPEED 52 M.P.H. AT SEA LEVEL.
RATE OF CLIMB 1470 F.P.M.
SERVICE CEILING 21,200 FT.
GROSS WEIGHT 4510 LBS.
ENDURANCE 2.14 HOURS.
CLIMB IN 10 MINUTES 10,800 FT.

NAVAL AIRCRAFT ORIGINALLY DESIGNATED FBC-1 WERE REDESIGNATED OC-1 (4 DELIVERED) DO DO DO DO FBC-3 DO DO OC-3 (21 DELIVERED).
ONE EXPERIMENTAL FBC-2 WAS DESIGNATED XFBC-2. THE PRODUCTION MODEL WAS DESIGNATED FBC-4. 36 OF THESE AIRPLANES WERE PROCURED. 9 PLANES OF THIS GROUP WERE LATER REDESIGNATED FBC-5 AND LATER OZC-1. NINE ADDITIONAL AIRPLANES OF THIS TYPE WERE PROCURED, MAKING A TOTAL OF 18 PLANES.
ONE XFBC-2 WAS PROCURED AS A PROTOTYPE. OZC-2. 43 OBC-2 PLANES WERE PROCURED. ALL OF THESE AIRPLANES WERE ASSIGNED TO THE U.S. MARINE CORPS. SIX OC MODEL AIRCRAFT SERVED IN NICARAGUAN CAMPAIGN. ALL PLANES OF THIS TYPE WERE DELIVERED TO THE NAVY BY JUNE 1928. 108 CURTISS FALCON TYPE SERVED THE U.S. NAVY.


PLYWOOD COVERING TOP AND BOTTOM SURFACES
STRUCTURAL SOLID WEB WING RIB
AILERON PUSH-PULL TUBE
END FITTING
STEEL TIE ROD
CLEVIS TYPE WING ATTACHMENT FITTING
DURALUMIN DRAG STRUT
DURALUMIN COVERED LEADING EDGE TOP AND BOTTOM
STRUCTURAL RIB FAIRED TO AIRFOIL PROFILE
CARTRIDGE EJECTION CHUTE ON UNDER SURFACE OF WING
WING GUNS CHARGED BY MANUALLY ACTUATED CABLE BY PILOT
GUNS ARE OUTSIDE ARC OF THE PROPELLER
SPRUCE AFT SPAR
STRUT POINT FITTING
BELLCRANK ASSEMBLY
FLEXIBLE TRAILING EDGE
WING RIB
CANTED DURALUMIN AILERON RIB
RIGID DURALUMIN TRAILING EDGE
STRUCTURAL RIB
CLEVIS HINGES WITH CONTINUOUS HINGE PIN
FABRIC COVERING
600 ROUNDS AMMO DURALUMIN TUBE CARTRIDGE TROUGH ATTACHING STRIPS FOR DURALUMIN COVERS
CALIBER 30 AIRCRAFT M.G. (BROWNING TYPE)
INSPECTION WINDOW
STRUT POINT FITTING TAPE TO STABILIZE WING RIBS
FORMER RIB
SPRUCE FORWARD SPAR
SPRUCE LEADING EDGE SPAR END FITTING
EACH WING EQUIPPED TO RECEIVE A-3 TYPE BOMB RACK (3 EACH WING)

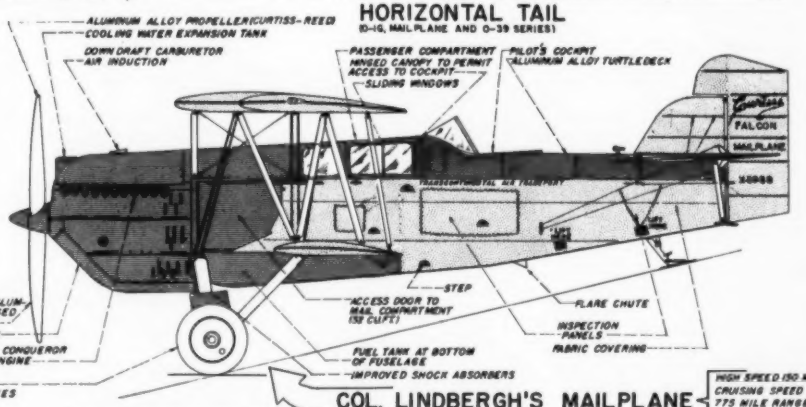
LOWER WING

(LEFT SHOWN—RIGHT SIMILAR)
(MODEL A-3B)



HORIZONTAL TAIL

(O-1G, MAIL PLANE AND O-39 SERIES)



COL. LINDBERGH'S MAILPLANE

HIGH SPEED 150 M.P.H.
CRUISING SPEED 133 M.P.H.
775 MILE RANGE
750 LB. MAIL LOAD

THE CURTISS FALCON OBSERVATION AIRPLANE AT THE TIME OF ITS INCEPTION WAS THE FINEST AIRPLANE IN THE WORLD FOR MILITARY PURPOSES. IN ADDITION TO HAVING A HIGH PERFORMANCE, IT POSSESSED HIGH STRUCTURAL EFFICIENCY BECAUSE GOOD USE WAS MADE OF EXISTING MATERIALS IN THE STRUCTURAL CONFIGURATION. THE AIRPLANE ALSO HAD FINE AERODYNAMIC CONTROL AND PERFORMANCE AT STALLING AND HIGH SPEEDS.

(SHEET NO. 4)

(DRAWN FOR MODEL AIRPLANE NEWS BY WILLIS L. NYE)

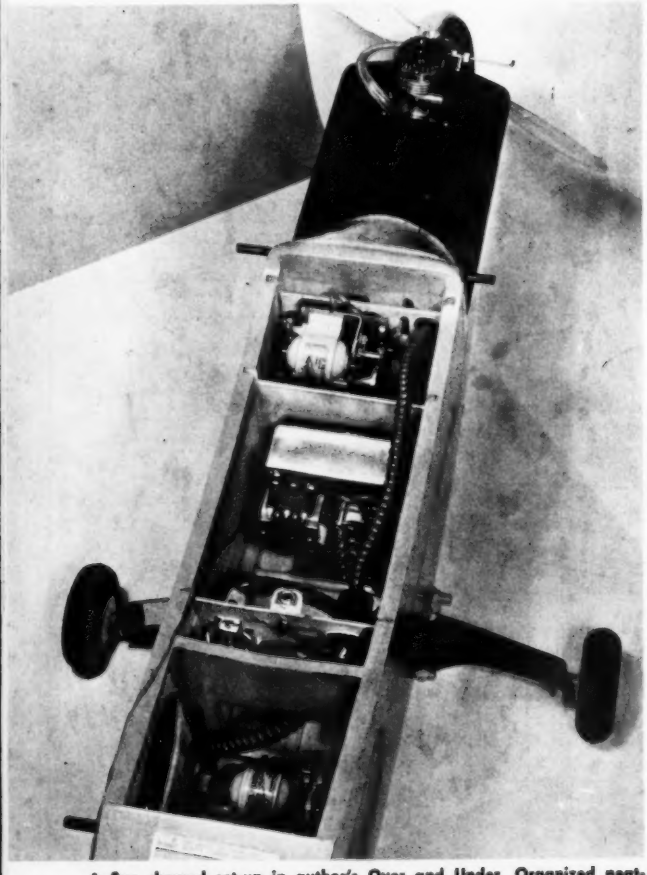
this is MULTI

PART TWO

By ERNEST KRATZET

When author says multi, he means five channels. Picture shows rudder, elevator, engine, on Babcock.

As overwhelming as this looks and sounds multi-control flying is not really difficult. You are pilot and ground crew of a real flying machine—but never forget it.

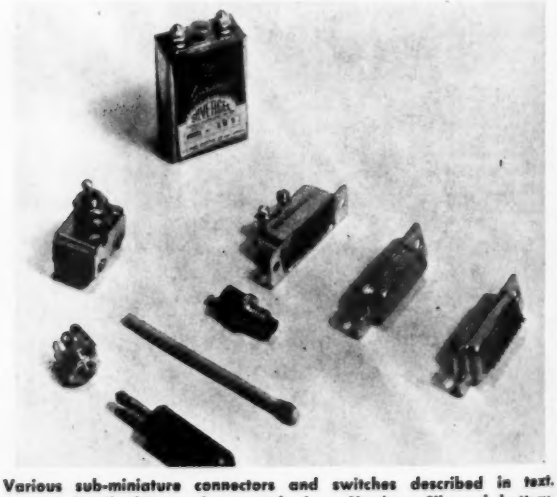


A five channel set-up in author's Over and Under. Organized neatness suggests reliability. All equipment slides out for servicing.

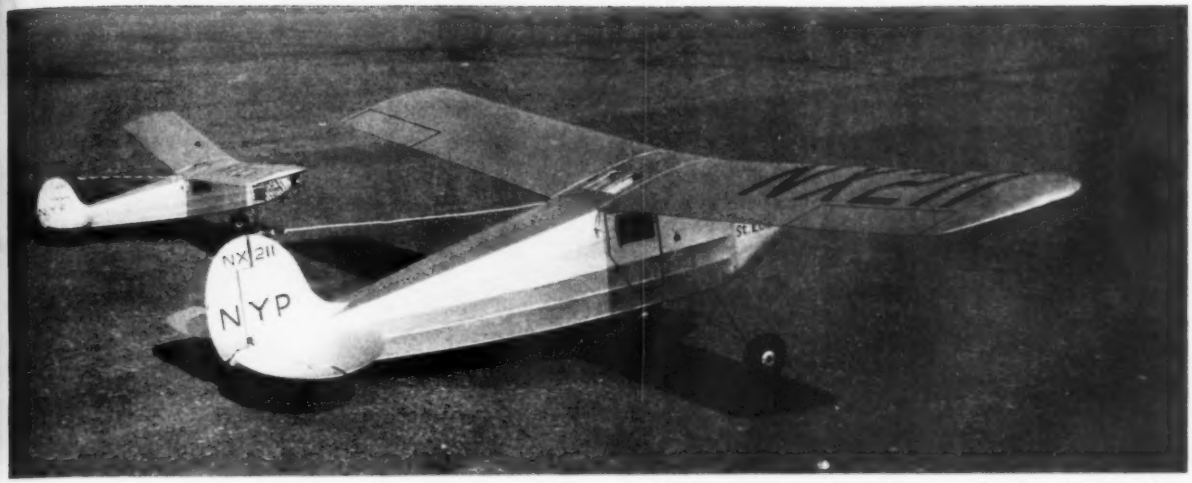
► Once in the air, the first thing to do before attempting any precision maneuvers is to get the ship properly trimmed at the desired engine speed. We've seen too many sloppy precision patterns flown because the pilot went into it before the plane was properly trimmed, and it is very difficult to trim while you're attempting to fly a predetermined pattern. One or the other will suffer.

In making 90 degree turns, it is always a good idea to trim in a small amount of up just before making the turn, and then to remove this up trim just before completing the turn. This will compensate for any nose down tendencies in the turn and is a good substitute for ailerons. Some of the more experienced fliers accomplish this by alternating rudder and elevator signals while the turn is being made. This takes a degree of skill but results in a good facsimile of a proportional turn.

One of the more spectacular stunts, and yet not too difficult, is inverted flying. The entry to this, of course, can be either a half inside loop or half outside loop. Perhaps the more conventional method, especially with non-symmetrical air foils, is the half inside loop, because less speed is built up. Many designs can only be kept on their backs by occasional application of left rudder. This phe-



Various sub-miniature connectors and switches described in text. At top, hardly bigger than match, is a Yardney Silvercel battery.



Spirit of St. Louis in two sizes, by Nat Rambo. Big ship, foreground, has the three channel receiver.

nomenon comes about because a ship, which has the proper amount of offset when upright, is out of trim on its back. (The *direction* of the offset changes but the torque remains in the same direction, either right-side-up or inverted.) So don't be surprised if your plane keeps doing nice Immelmans when you want it to fly straight. Just apply occasional left rudder to prevent the roll-out.

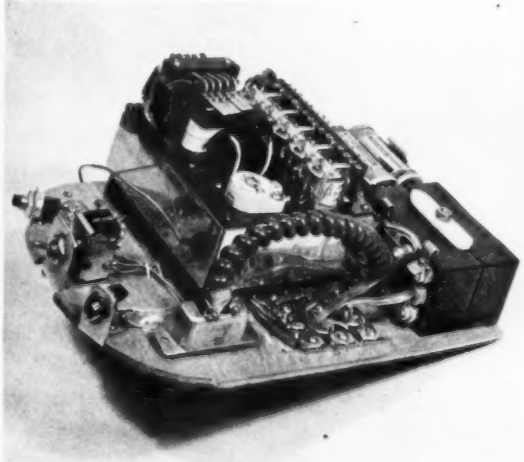
Be cautious when you pull out from inverted flight. It can happen that by completing the required half inside loop to return to the upright position (holding full-up), that you might build up too much forward speed and, if the nose heads up again at too high an angle of attack, the result will be a disastrous high-speed stall. In such a condition, the plane acts something like a duck that's been hit by both barrels from a 12 ga. shotgun. It's something you'll never want to encounter, so after returning from inverted flight via a half inside loop, make sure you keep the nose down in level flight until the excess speed dissipates.

Good hammer-head wingovers can be done by a shallow dive, a pull-up into a stall, and then just *before* the plane loses all lift, hit and hold hard rudder. Performed with the correct timing, and with a fast rudder servo, the plane will kick over and back down while the elevator is neutralizing. Experiment by kicking both rudders and you'll probably find that one way is easier to execute than the other.

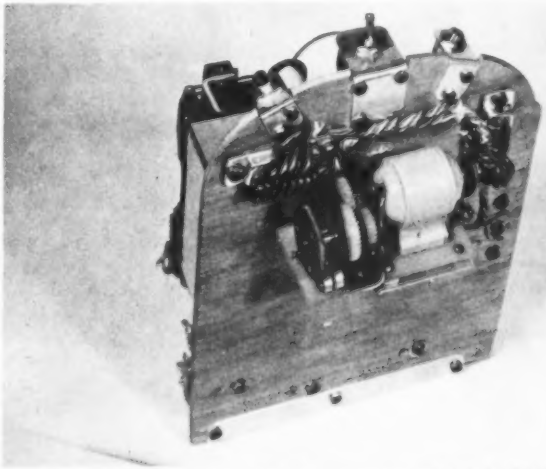
Outside loops are generally difficult to execute without a symmetrical wing. If you get up the nerve to try one, be sure you have plenty of altitude. Many designs will begin to tuck under slightly and remain that way even though full down is being held. If your ship acts this way, and you're still determined to do an outside loop, try this: Go into a vertical dive for a couple hundred feet, then for just a second or two neutralize the elevator, then hit full down again, and hold until the loop is finished. The result will be not a perfectly round loop, but one that has a flat spot on the forward side, resulting from that neutralizing of the elevator momentarily. This business of allowing the nose to come up slightly before going completely around was discovered by accident, but seems effective.

By taking the plane momentarily out of a "grooved" dive, some sort of an inertia force is created which makes it easier for the plane to snap around.

As an interesting sidelight, there are authentic reports that L.D. Crisp from Indiana can do consecutive outside

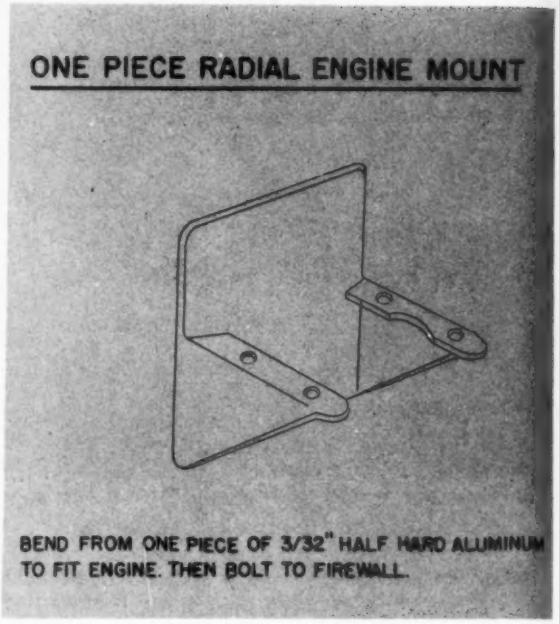


They laughed when I sat down at the organ—oops! Rear view of tray from ESKimo bipe. Holds all gear except rudder, elevator servos.



Front view of the same tray, showing mounting of deBolt 3P3NX servo for operating Bramco throttle. Tray measures 5¼ in. wide.

Pioneering commercial multi-channel equipment was Rockwood, whose radio equips this "Schneider Cub," flown by Lyle Sewell, at Nats.



loops with a plane which has an *undercambered* wing. (Symmetrical wing advoctes take notice.)

RECEIVER INSTALLATION & WIRING

Much grief can be avoided if you mount *all* your gear so that it is readily removable. There's no harder task than trying to resolder a bad joint that's hidden way down in the bottom of a fuselage. This, of course, is a problem in itself because at the same time you want all your gear fixed solidly. One method is to put everything in a removable box which fits inside the fuselage. However, when you get the box out you have still much the same problem, although perhaps to a lesser degree. Another method is to use sliding trays. These are usually plywood and are much like a removable bulkhead. They are held firmly in position by runners attached to the fuselage sides. Trays have the advantage of being able to be installed flush up against a permanent bulkhead which will take the impact of a hard jolt. The receiver can then be mounted vertically on the tray so that its inertia forces are brought to bear on your strongest bulkhead. The tray method allows everything to be mounted out in the open for easy maintenance. The number of trays required is determined by the inside dimensions of the fuselage and the brand of equipment used. Generally speaking, the smaller the fuselage, the greater the number of trays. Two examples can be seen in the accompanying photographs that illustrated last month's article. One showed the installation for a complete 5-channel Bramco unit in an "Over and Under." The forward tray holds the batteries, a terminal strip, and the engine control servo (deBolt 3P). The center tray accommodates just the Bramco receiver. The third tray is for much of the wiring, switches, meter plug, and the socket connections which allow either of the other two trays or the servo platform to be removed separately. Thus, by removing one pushrod and one plug, you have the first tray in your hands for checking, charging or changing batteries. Removing another plug allows the receiver to slide out as a unit. Removing two pushrods, a wingnut, and another plug puts the rudder and elevator servos on the bench.

One picture illustrates this same principle applied to a larger plane. On the one tray we have *everything* except the rudder and elevator servos. It contains the Bramco "Blue Chip" receiver, four Silvercels (LR-1) for filaments and *all* servo power, hearing aid 'B' batteries (3—22½ v), a terminal block, an off-on switch, a plug to check receiver current, an auxiliary switch for indexing the engine control servo without transmitting a signal, two 15 pin sockets (one for detaching receiver from tray and the other for disconnecting rudder and elevator servos), and finally, on the forward side, we have a deBolt 3P3NX servo for engine speed control. When this tray is pulled out there isn't a single wire left inside the fuselage. The total weight of this tray including all components is 25 oz. Allowing an additional 7 oz. for the rudder and elevator servos plus their mounting and cable, we have a total 5 channel installation weighing just 32 oz. Not too bad when you consider that the ½ A planes have to carry this and more to win the PAA Cargo event.

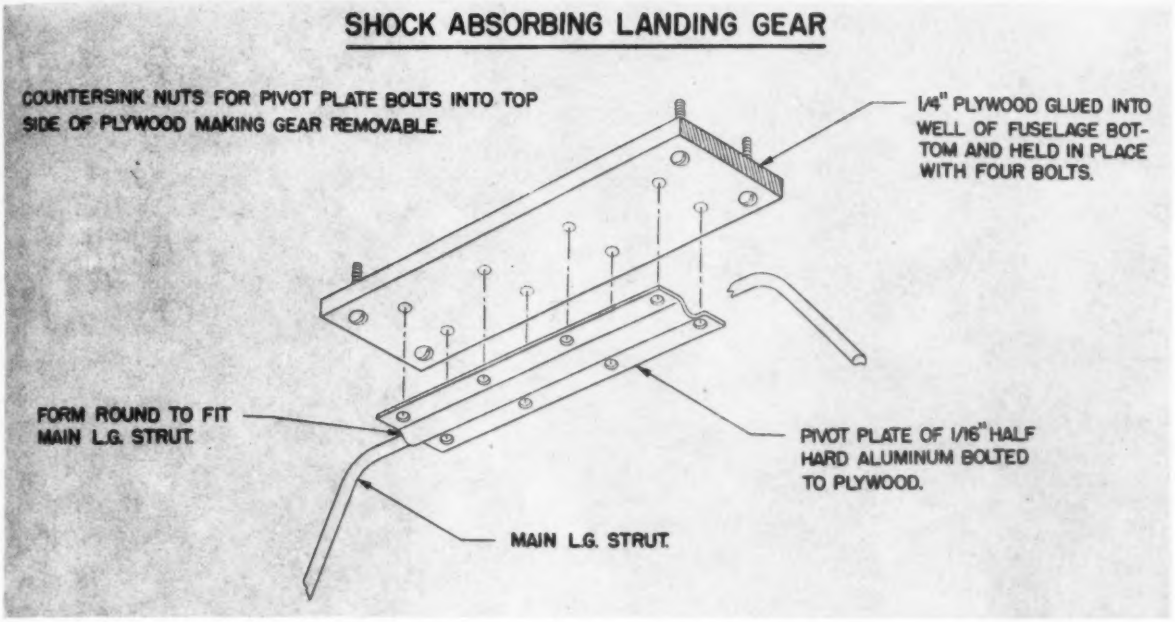
These trays have another feature in that all wires are laced and glued firmly to the tray. No loose wires to vibrate, causing fatigued solder joints. The cables are fashioned from as many as 15 separate wires, either laced together or covered with a plastic spiral housing such as that found on a telephone cord.

The Bramco "Blue Chip" and "Gold Chip" receivers shown in these illustrations have been mounted to the trays with ¼" x ⅜" sponge rubber weatherstripping. The rubber is glued to the tray and to the bottom of the receiver case with Pliobond glue. By removing 4 small self-tapping screws the entire receiver chassis separates from the lower case for inspection of relays, tubes, etc.

A picture shows some of the hardware used in such an installation. The 15 pin plugs and sockets are by Cannon (DA-15) with boot, which are listed in the Newark catalogue. The plug and jack from Switchcraft (#755). The push-button switch is by Grayhill. The DPDT switch by Electro-Snap (A3-8). The batteries are by Yardney Silvercel Co. (LR-1) weighing 1 oz. each.

Whatever your method of installation, remember that a typical hook-up like this has over 200 individual connections and failure of any *one* of them might ruin your plane. Thus, there are

SHOCK ABSORBING LANDING GEAR


COUNTERSINK NUTS FOR PIVOT PLATE BOLTS INTO TOP SIDE OF PLYWOOD MAKING GEAR REMOVABLE.
1/4" PLYWOOD GLUED INTO WELL OF FUSELAGE BOTTOM AND HELD IN PLACE WITH FOUR BOLTS.
FORM ROUND TO FIT MAIN L.G. STRUT.
PIVOT PLATE OF 1/16" HALF HARD ALUMINUM BOLTED TO PLYWOOD.
MAIN L.G. STRUT.

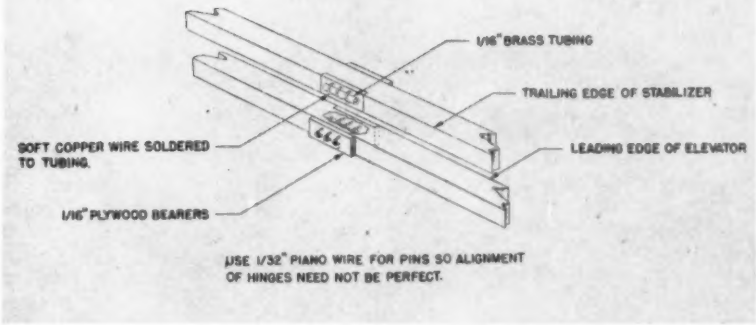
no "important" connections. They're *all* vital to a properly functioning multi-channel rig. A good rule to follow is to make a perfect bond *each time*, then tie the wire down so it can't vibrate. Extra precaution here really pays off in trouble-free flying.

Be sure to use hookup wire that has at least 9 strands per wire. Thirteen strand wire is available and is better. Don't try to get away with 5 or 7 strand wire. It will fail too soon. On the battery leads that have to be disconnected or resoldered often, it is wise to use wire with even more strands, such as the cotton covered flexible wire that has as many as 35 strands. If you find the cotton insulation too difficult to work with, try removing it and replacing with a length of plastic spaghetti.

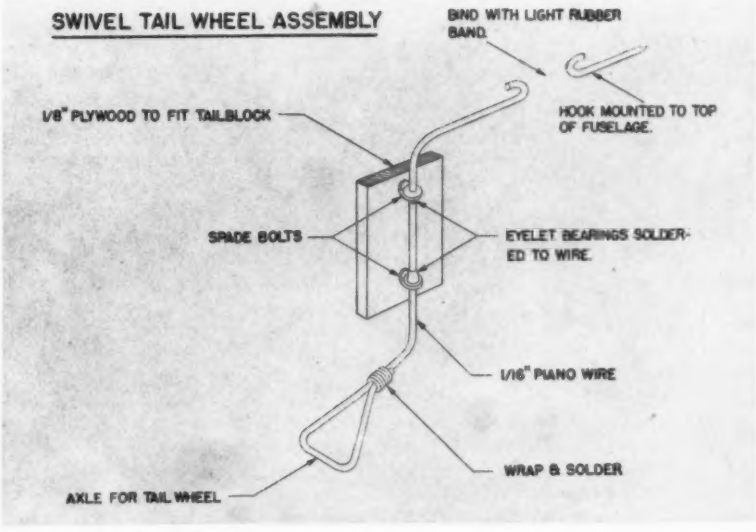
Just a word here about the advantages of Silvercels. Each LR-1 cell is rated at 1.45 volts under load and will deliver its current at this voltage constantly *regardless of the amount of the drain*. Thus you're always assured of constant power for your servos which results in more reliable operation. This is especially true if you're using servos that have a mechanical brake which might have too much braking pressure when the voltage drops due to use. The point here is that with Silvercels the voltage never does drift downwards.

You'll need a minimum of four cells for a total of 4 ozs. This is about as light a power pack as you can get even considering pencells. Because of the constant voltage characteristics you can tap off for (*Continued on page* 44)

ELEVATOR HINGE DETAIL FOR PLANES


1/16" BRASS TUBING
TRAILING EDGE OF STABILIZER
SOFT COPPER WIRE SOLDERED TO TUBING.
LEADING EDGE OF ELEVATOR
1/16" PLYWOOD BEARERS
USE 1/32" PIANO WIRE FOR PINS SO ALIGNMENT OF HINGES NEED NOT BE PERFECT.

SWIVEL TAIL WHEEL ASSEMBLY


BIND WITH LIGHT RUBBER BAND.
1/8" PLYWOOD TO FIT TAILBLOCK
HOOK MOUNTED TO TOP OF FUSELAGE.
SPADE BOLTS
EYELET BEARINGS SOLDERED TO WIRE.
1/16" PIANO WIRE
WRAP & SOLDER
AXLE FOR TAIL WHEEL

There's something special...

something very outstanding...

about these famous

engines

● Call it pride of ownership . . . pride of performance . . . whatever you will. There's something about a McCoy that sets it apart — unmistakably — from all other model airplane engines. Take this McCoy Super Stunt "29", for example. It's tops for guaranteed easy starting . . . guaranteed full power . . . ruggedness . . . all-around dependability for stunt, free-flight, combat, and team racing. Then — there's the big, big "plus" of its sensational and exclusive McCoy "Micro-Five" slug pistons! Think of it . . . they are machined and micro-finished to tolerances of 5 millionths of an inch in both concentricity and size! What does this mean to you? It's your assurance of the perfect fit of every McCoy piston and sleeve . . . matchlessly engineered interchangeability of parts . . . minimum break-in. And still more . . . there's McCoy's amazing, unequalled-for-value low price of just $7.95 for any engine in the Super Stunt "9," "19," "29", and "36" series! Reasons a-plenty for *you* to join the thousands and thousands of proud modelers who prefer to fly with McCoy. See your dealer now. He will have exactly the McCoy engine you want . . .

TESTOR CHEMICAL COMPANY, ROCKFORD, ILLINOIS

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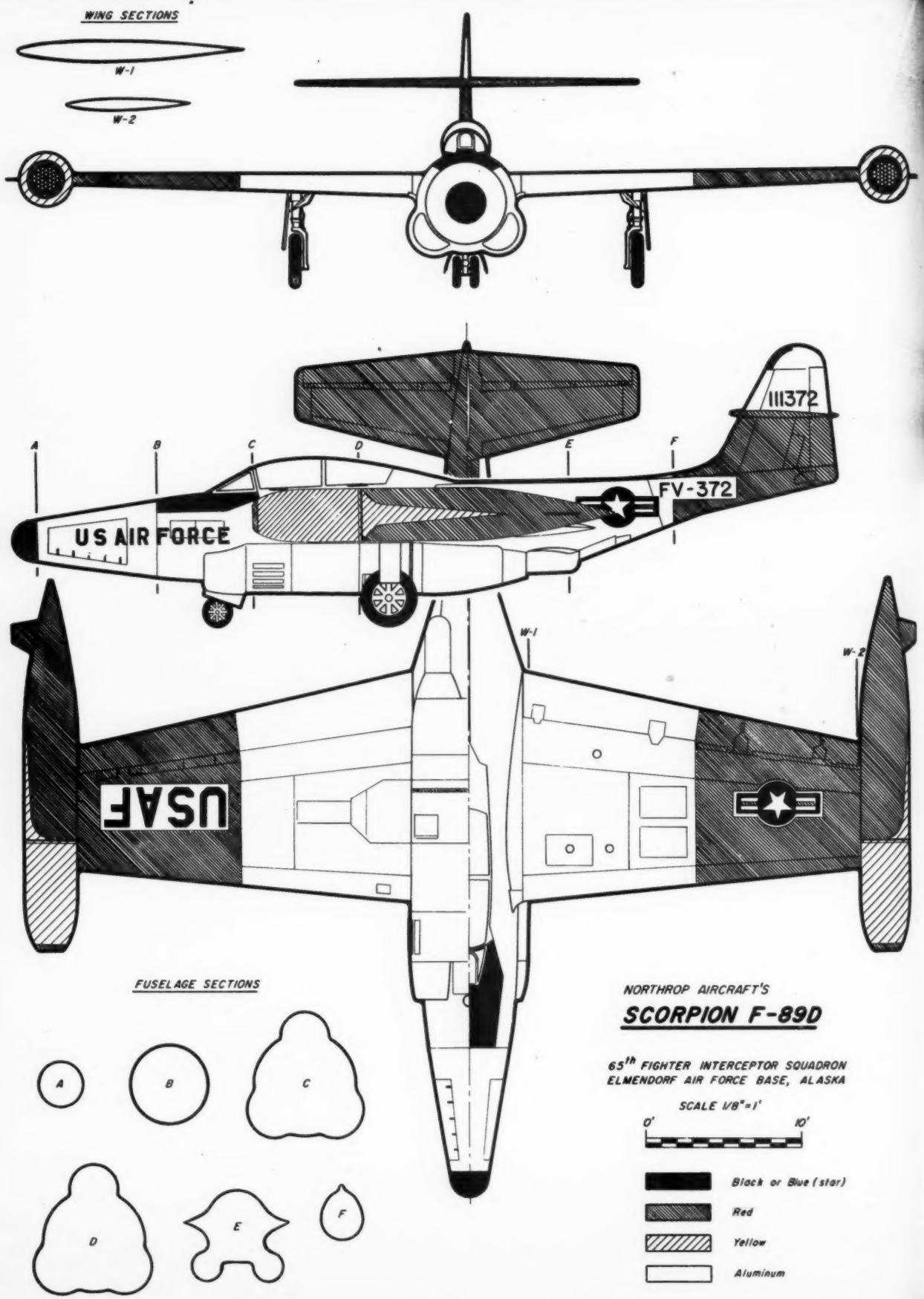
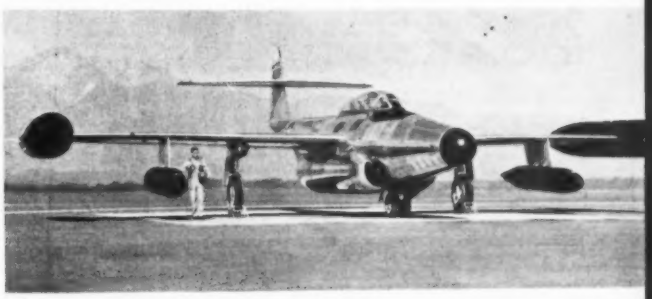
European Sales Office: Stockholm-Stocksund, Sweden

• McCOY SUPER STUNT "29"


WING SECTIONS
W-1
W-2
111372
A
B
C
D
E
F
FV-372
US AIR FORCE
W-1
W-2
USAF
FUSELAGE SECTIONS
A
B
C
D
E
F
NORTHROP AIRCRAFT'S
SCORPION F-89D
65th FIGHTER INTERCEPTOR SQUADRON
ELMENDORF AIR FORCE BASE, ALASKA
SCALE 1/8"=1'
0'
10'
Black or Blue (star)
Red
Yellow
Aluminum

Solid Scorpion...



Wing-tip fuel pod points arrowlike at another Air Force Northrop. F-89 is first interceptor designed specifically for all-weather mission.

By PHILIP B. WOODROOFE

Whittle this great Air Force all-weather fighter and you can brag that you made it. Sparkling addition to the collection.

Early photo of black-painted Scorpion headed "upstairs." Top, right: Huge size of two-man fighter emphasized in interesting ground shot.

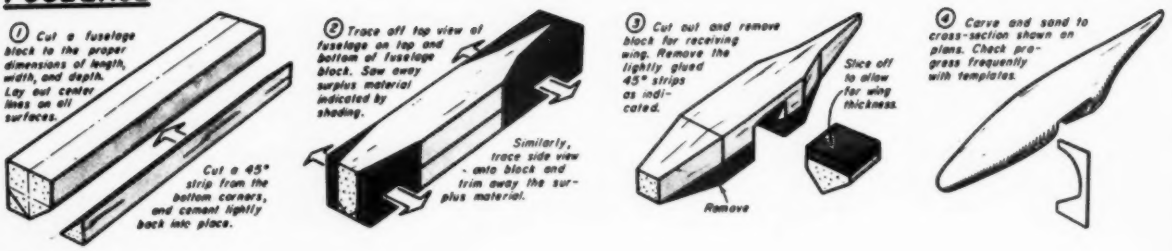
Powerful Allison J35 turbojets push heavyweight fighter at speeds above 600 mph at better than 45,000 ft. Carries 104 2.75 in. rockets.

► In service at present are three all-weather interceptors, flown by the Air Force throughout the world. These might aptly be called the "Three Rocketeers" as they utilize rockets for armament. The largest, and the plane with the most fire-power, is Northrop's F-89, the "Scorpion," which appeared on the drawing-boards shortly after V-J Day.

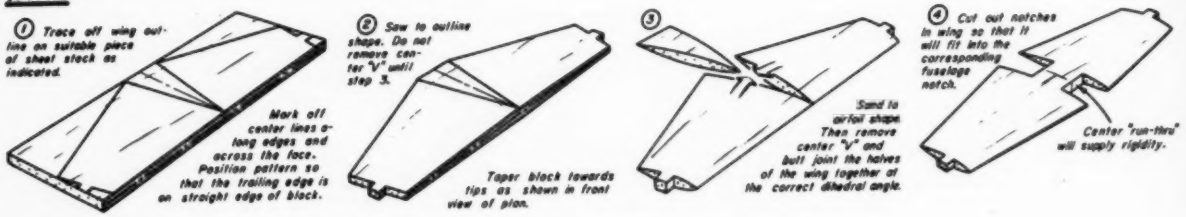
The problem of all-weather interception is one of pilot techniques and aircraft instrumentation; its effective solution lies in the field of electronics and communications. It begins with the "early warning" ground radar operator watching a circular oscilloscope for any unusual targets coming within his range. If one does, he must determine immediately whether the target is friend or foe. He does this with an allied bit of radar gear called an "interrogator" which electronically questions the unidentified target. If all means of friendly identification fail, the radar site, through the control center, must "scramble" a fighter element or squadron, depending upon the estimated size of the unidentified target.

The pilot and the radar observer (the pilot alone in the case of the F-86D) now jump into one of the three currently used all-weather fighters, and are airborne and ready for vectoring instructions from the ground within two to four minutes. The ground radar controller's task is to merge two dots on his radar screen—the target and the interceptor—to the point where the airborne radar set can take over its own precise job of stalking the prey. Three dimensions are involved in vectoring the interceptor (a moving dot) in the direction, altitude and distance to the proximity of the target (another moving dot.) It is a complex job but handled effectively by experienced controllers. These preliminary instructions are established solely by use of the ultra high frequency radio, the pilot obeying the controller to the letter as to which way to turn, whether to climb or descend, and whether to increase or decrease speed. CONTINUED ON NEXT PAGE

FUSELAGE–


1 Cut a fuselage block to the proper dimensions of length, width, and depth. Lay out center lines on all surfaces.
Cut a 45° strip from the bottom corners, and cement lightly back into place.
2 Trace off top view of fuselage on top and bottom of fuselage block. Saw away surplus material indicated by shading.
Similarly, trace side view onto block and trim away the surplus material.
3 Cut out and remove block for receiving wing. Remove the lightly glued 45° strips as indicated.
Slice off to allow for wing thickness.
Remove
4 Carve and sand to cross-section shown on plans. Check progress frequently with templates.

WING–

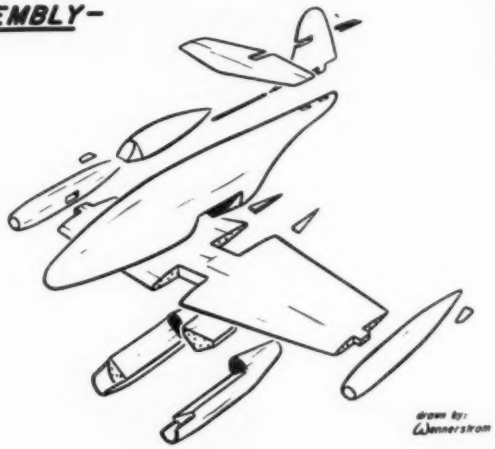

1 Trace off wing outline on suitable piece of sheet stock as indicated.
Mark off center lines along edges and across the face. Position pattern so that the trailing edge is on straight edge of block.
2 Saw to outline shape. Do not remove center "V" until step 3.
Taper block towards tips as shown in front view of plan.
3
Sand to airfoil shape. Then remove center "V" and butt joint the halves of the wing together at the correct dihedral angle.
4 Cut out notches in wing so that it will fit into the corresponding fuselage notch.
Center "run-thru" will supply rigidity.

JET NACELLES–

1 Nacelle construction is generally similar to fuselage construction. First cut a block to correct size. Mark off center lines and the 3 sections of the nacelle — air scoop, engine housing, and exhaust. Cut the sections apart and glue lightly back together.
2 Lay out top outline of nacelle and trim block to shape (remove material shown shaded). Repeat process for profile view.
Remove
3 Sand the roughed out block to a cylindrical cross section. Remove the air scoop and exhaust sections and hollow them out. Re-glue permanently.
Tip pods are similarly fashioned.

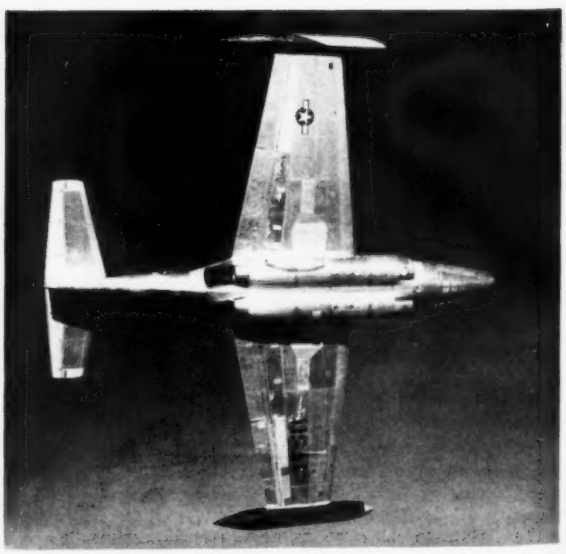
EMPENNAGE–

ASSEMBLY–



As the interceptor approaches the target its own radar observer takes over and scans the area in front of the aircraft. When the target appears on the screen it is "locked in" the radar set, and the pilot starts to maneuver, following only the indications on the radar scope. If his technique has been good, as the target comes within firing range the 2.75-inch rockets will fire automatically at the target, and one of these rockets is capable of destroying a B-36. Once the rockets are fired the pilot must "break off" and, flying safely through adverse weather, return to base.

The basic design consideration for this new All-Weather Fighter was that it be fundamentally an interceptor, with the addition of electronic equipment. On the surface this may appear to be a small consideration, but when the so-called electronic equipment includes a radar antenna, a power supply, radar indicators, a modulator unit, radar-gyroscopes, a communication interphone, IFF, radio compass, radar gun-laying computer, gyrosyn compass, zero reader, UHF radio–plus special anti-icing equipment, an electrically heated windshield, engine-intake protection, pressurization, heating cooling, dive-brakes and ejection seats–you have space and weight factors necessitating an extremely (*Continued on page* 57)



Details of interest to the scale fan, notably the faired-in turbojet nacelles, show up clearly in this dramatic picture from underneath.

1956 Nationals

Results of the 25th Annual "Big Meet," held at Dallas Naval Air Station, Texas, between the dates of July 23-29. Was hot, windy.

Break up the Yankees? Better they should break up Woody Blanchard. From Hampton, Va., Willard champ again, and this is his reward.

WHO WON?

Grand National Champ ..... **Willard S. Blanchard**
Open National Champ ..... **Willard S. Blanchard**
Sr. National Champ ..... **John Wells**
Jr. National Champ ..... **Brent Hawkins**
Club Team Champ ..... **Air Force**

Smiling John Wells, Wichita, Kan., is the new Senior Champion and, promising youngster Brent Hawkins, Morton, Ill., Junior Champ.

INDOOR

Stick: Open—Joe Bilgri, 18:07.2; Sr.—Paul Crowley, 20.02.0; Jr.—Brent Hawkins, 8:31.1.

Paper Stick: Open—Joe Bilgri, 11:24.2; Sr.—Paul Crowley, 11:48.1; Jr.—Art White, 8:35.0.

Cabin: Open—Joe Bilgri, 11:55.0; Sr.—Paul Crowley, 9:54.0; Jr.—Brent Hawkins, 4:01.1.

Hand-Launched Glider: Open—Bob Hanford, 1:02.2; Sr.—Johnnie Werts, 0:51.2; Jr. Dick Mathis, 0:42.1.

GLIDER

Hand-Launched Glider: Open—John D. Nagy, 6:47.0; Sr.—Curtis Stevens, 7:17.7; Jr.—Frederick Weisflog, 4:30.9.

Towline, Limited: Open—S. B. Savage, 10:27.2; Sr.—Ed Christenson, 9:04.0; Jr.—Billy Bell, 3:47.0.

Towline, Nordic: Open—G. E. Snavely, 15:00.0; Sr.—Donald Burnett, 14:28.0; Jr.—Dick Mathis, 9:24.6.

RUBBER

Wakefield: Open—Edward Stoll, 14:52.5; Sr.—Harold Thompson, 14:07.0; Jr.—Brent Hawkins, 10:13.4.

Unlimited: Open—Joe Bilgri, 13:51.2; Sr.—Harold Thompson, 8:41.7; Jr.—Peter Reinhart, 5:20.0.

FREE FLIGHT

Half-A: Open—Fred W. Salmon, 14:29.6; Sr.—Glen Carlile, 12:55.0; Jr.—Kenneth D. Deibold, 9:35.8.

Class A: Open—J. R. Hayden, Jr., 17:08.0; Sr.—Jim Watson, 13:59.8; Jr.—Gene Boyd, 12:22.0.

Class B: Open—Richard McGrath, 28:35.1; Sr.—Robert Nichols, 14:45.4; Jr.—Dennis W. Alford, 14:01.0.

Class C: Open—James Patterson, 18:00.0; Sr.—Johnnie Werts, 16:25.0; Jr.—Dennis W. Alford, 12:30.7.

ROW: Open—Otis D. Goss, 15:45.2; Sr.—Lee Hines, 10:15.0; Jr.—Dennis W. Alford, 10:28.7.

Flying Scale: Open—Bruce B. Lynn, 199.98; Sr. & Jr.—Bob White, 54.56.

PAYLOAD

American Class: Open—Willard S. Blanchard, Sr., 11:39.4; Sr. & Jr.—Charles Gilliland, 9:43.0.

International: Open—Sal Taibi, 15:47.2; Sr. & Jr.—Phil Grau, 10:08.4.

Clipper Cargo: Willard S. Blanchard, 42 ozs.

Jet: F. L. Swaney, 5:47.5.

Jetex 50: Jr. only—Brent Hawkins 2:20.2.

CONTROLLINE

Speed Half-A: Open—Bill Wisniewski, 98.43; Sr.—Phillip Bussell, 90.60; Jr.—Larry Thomas, 87.34.

Speed A: Open—Bill Wisniewski, 145.57; Sr.—Phillip Bussell, 136.31; Jr.—Larry Thomas, 126.71.

Speed B: Open—James Z. Paysen, 148.09; Sr.—John Wells, 133.48; Jr.—Larry Thomas, 136.72.

Speed C: Open—Lelard Morton, 161.81; Sr.—Tom Byar, 160.79; Jr.—Thomas Kovan, 136.00.

Proto Speed: Open—Dale Biggs, 111.82; Sr.—R. L. Starr, 95.20; Jr.—Larry Draper, 96.42.

Jet: Open—James A. Summersett, 166.60; Sr.—Piper A. Mason, Jr., 159.09; Jr.—None.

Stunt: Open—George M. Aldrich, 321.33; Sr.—Bill Cummings, 324.0; Jr.—Dennis W. Alford, 299.5.

Flying Scale: Open—Capt. R. Moorhead, 398; Sr.—Jim McCroskey, 303; Jr.—William Brown, 159.

Combat: Open—Riley Wooten, 100; Sr.—Bruce Brown; Jr.—Ken Knotts.

Team Racing: Kenneth Morse.

U. S. NAVY CARRIER

Open—Solomon J. Train, 363.52; Sr.—Glen A. Magree, 307.16; Jr.—Donald Sterner, 249.85.

RADIO CONTROL

Multi-Channel: Howard Bonner, 197½.

Rudder-Only: Open—Harry Young, 73; Jr. & Sr.—Gerald Nelson, 83.

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Parnell Schoenky, 144.1.

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RUBBER MODELS

P. G. F. CHINN

FOREIGN NOTES

A monthly world-wide round-up of technical developments, designs, significant industrial products.

Soviet States Internationals

This year, the Russian sponsored Eastern States International Championship meet was held at Dunakeszi, near Budapest, Hungary. Hungary was last year's team winner. On the team basis, Hungary won again this year, amassing some 4125 points, with Czechoslovakia only 6 points behind. East Germany was third with 3619 points, followed by Rumania, Soviet Russia, Yugoslavia and, competing for the first time, China. Czechoslovakia provided first-place winners in each of the three free-flight categories.

In the Wakefield event, the noted Czech exponent, Radoslav Cizek, recorded 900 sec. to win from Matvejev of the U.S.S.R. (last year's winner) with 875 sec., and Hungary's Benedek (of airfoil fame) with 830 sec. Cizek's model had a medium-long, square-section fuselage, folding prop, end-plates on the stab and a high aspect-ratio, polyhedral wing with elliptical tips. Matvejev had an interesting looking long-fuselage design of all-geodetic construction.

In the towline event, Vladimir Spulak (Czecho) totaled 849 sec. to win with a typical Continental slim fuselage A2 and Rudolf Cerny (Czecho) won the gas event, totalling 900 sec., with a fairly conventional VTO pylon design powered by an AMA 2.5 c.c. diesel. All three free-flight contests were flown off between the hours of 5.10 a.m. and 8:20 a.m. in order to obtain air conditions less subject to thermal activity.

In the speed class (.15 cu. in. motors) the Czech wizard Sladky, exponent of the remarkable MVVS engine, was narrowly beaten by Beck of Hungary, at a speed of 113.5 m.p.h. At this writing it is not known what engine Beck was using, but he has previously used a Super-Tigre G.20 in this class. For the first time a stunt event was included in this annual meet. It took the place of the previous jet class and was won by G. Vass with 497 points.

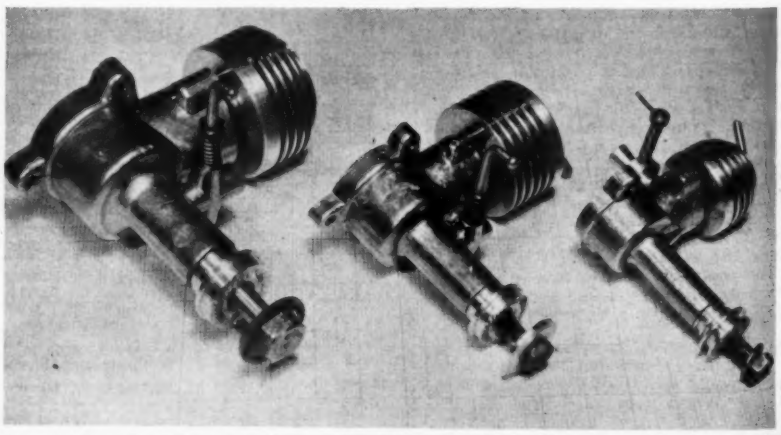
As in previous years, each country sent one man only to fly in each class and, as we have remarked before, this certainly places quite a responsibility on the individual.

Modeling in France

We have often regretted, in this column, that so little news has been received of French modeling during the past few years. We were most happy, therefore, to have a letter from S/Sgt. John Stewart, who is stationed in Central France, giving his impressions—especially as, when seen through the eyes of an American, it is much easier to pick out the items which appear particularly remarkable to us. We can do no better than to quote from S/Sgt. Stewart's letter.

"French model builders," writes Sgt. Stewart, "are greatly hampered by difficulties in obtaining materials. Hobby shops are mostly found only in the large cities: if one lives elsewhere, he must order by post. Cost of balsa, dope, etc., is about the same as in the States, but motors and kits are very expensive. Price of a Micron 5 c.c. glow-plug engine is about $21.00 and a stunt kit I looked at was nearly $10.00." (This is more serious than it sounds; since wages, etc. in France are on a very much lower scale than in the U.S.—PGFC). "Then, too, French motors are not too good. They operate at very low r.p.m. (mostly in the range of 8000-9000 rpm) and are heavy. Such items as prefabbed bellcranks, stunt tanks, timers, hot fuel proofer are just about unknown and glowplugs are almost impossible to get.

"The strange thing about all this is that despite these difficulties, there is a fair amount of activity and these people do extremely fine work. For the most part, the hobby is considered as being one for adults; one sees very few youngsters who are active model builders. Since, for any, there are transportation problems, knock-down construction is the word. I have seen a Nordic A2 which broke down into nine separate sections. There is also much experimenta-



Few people make their own engines, so here's three Diesels, by V. Kohout of Prague, Czech.

Familiar waiting line, but at Soviet Internationals, with Berko, Hungary, in foreground.

tion, some of it pretty weird."

In conclusion, S/Sgt. Stewart invites contact with French modelers in central France. Anyone interested can write to him via this column.

Progress in Germany

The model industry in Germany is continuing to make big strides. Some idea of the large amount of equipment now available to German enthusiasts can be gained from the very comprehensive catalogue put out by the firm of Gottfried Brunnenkant of Heppenheim. A range of RC equipment is now being offered by several manufacturers, including a complete "Stegmaier" system of pneumatic control actuation at about $150.00.

New motors include .049, .11 and .15 cu. in. Webra glow motors; a twin-ball bearing Taifun .09 diesel with a Cox-type reed-valve and multi-jet induction unit; the low-priced "Leopard" and "Tiger" diesels and the well-made "Jaguar" and "Star" engines. As regards kits, Western Germany now has the biggest and widest range of kits outside the U.S.A. and Britain. Recent newcomers to the trade are "Star-Models," under the direction of Eric Spivey who formerly handled Webra sales.

An indication that the Germans see an expanding and fruitful market in model airplanes is given by the recent entry of the famous "Schuco" firm into the industry. Under the name of "Schuco-Hegi," four control-line kits have been introduced, known as the Hegi-10, -20, -30 and -40. Also available are Schuco-Hegi dopes, control-handles, tanks, wheels and other hardware.

Australian Comment

Some interesting comments on the model engine situation in Australia come from Derry Brown, noted Victoria model builder. Most well-known types of motors, in addition to Australia's own Sabre engines, are more or less available in Australia at the moment, including a limited number of American engines. The "engine of the moment," however, is the Japanese O.S. Max. Max 29's, 35's and 15's can be readily obtained and have, apparently, made a hit with Australian stunt and combat (Max 29 and 35) and free-flight and team race (Max 15) enthusiasts in particular.

The popularity of Diesels, says Derry, is definitely on the decline except in the smaller sizes and among beginners.

Exit World Speed Championships?

It is again being mooted whether speed flying should be discontinued as an event in the World Championships calendar. British *Model Aircraft* magazine now suggests that the idea put forward of substituting team racing (*Continued on page* 54)

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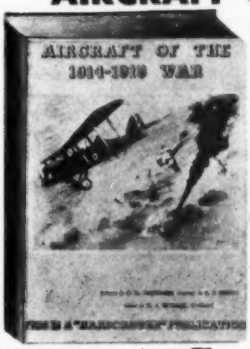

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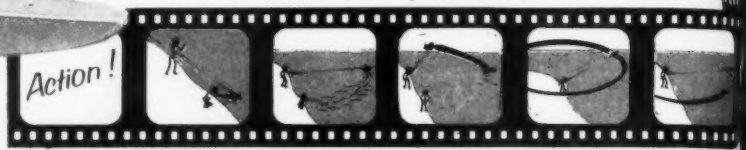

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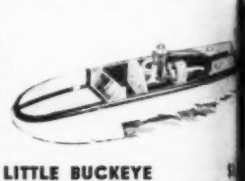

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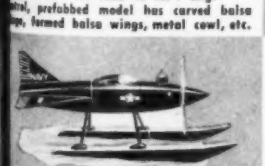

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MAN at Work

(*Continued from page 7*)

ladies, carnations for the gents' lapels, coffee on the hour, chicken for lunch. P.S. swell contest . . .

• • •

► "We have developed a new type of flying called 'blooping'," announced George Hazelrigg and Donald Klein, Deal, N. J. "It is not at all like combat, stunt, or speed, but it's real fun and, in the whole flying sport, nothing can beat "blooping'." Well, whatever "blooping" is we could stand some new ideas to try, so the soap box is yours. Take it, Don and George.

"Blooping is a maneuver," they say, "in which the plane hangs in the air close to the vertical position, not going up, but either going backward or forward. The direction is controlled by the elevator, which has an excessive amount of control, and it can be used for an air brake. This maneuver is accomplished by using a motor, preferably the smallest called-for displacement, running at a speed at which the plane will just move fast enough to take off. If the motor is revving too high the plane will not bloop properly. A plane that is powered right to bloop will land by simply allowing full up to act as an air-brake to slow the plane for a landing. In doing this, if the plane is overpowered it will tend to gain altitude. This is not desirable.

"After landing, the plane is kept on the ground by the application of full up, which acts as a brake to slow the plane below flying speed. The take-off is accomplished by applying neutral elevator until the plane has accumulated flying speed, at which slight up is given to bring the plane in the air.

"To bloop once the plane is in the air, one applies full up in one quick snap of the wrist. This should bring the plane to the vertical position, almost to a full stall. To regain horizontal flight, one gives slight down until the plane is in the horizontal position. Blooping must be done at about shoulder level. Throttle controls are strictly prohibited but, though seemingly impossible, this all can be done by an experienced flier in one flight at the same engine speed.

"The plane we are using for blooping is a Guillow Profile Trainer, powered by a Fox .19. We clogged the venturi to a point at which the motor ran at just enough revs to move the plane at a flying speed. You will find that once the plane is in the air, it tends to gain speed if the motor is running too fast. When this happens, a vigorous movement (up and down) of the controls is used to slow the plane.

Happy "blooping."

Royono

(*Continued from page 17*)

performance in any way. I don't believe it suffers at all in the glide from its size; the Gottingen is efficient and gets quite a lot of help from the stab. And of course the climb can be mighty exciting with a good engine, yet is quite docile because of the long tail moment. Thus the Royono is a clean design that will keep coming back for more, and the blend, I suggest, is worth looking into.

The Gottingen 602 in the wing is well-known to most builders and examples the conservatism I still feel about B-C ships. To me they retain some of the grace we used to know with the big class D ships

a few years back, and I like to stay with undercambered sections in them even though I've been shown often enough that I'm probably sacrificing a little pure performance. But I still insist that this kind of pure performance produces more small pieces of models than contest wins. So preferring smooth flying, I stay with the Gottingen for B-C ships. The stab size on the Royono is a little bit unusual at 56%. It emerged from moving the firewall back from its position on the original version, and not wanting to close up the small angular difference between the wing and stab any further. I feel a good deal of caution about generalizing here, but it does seem that on this particular ship the unusually large stab really helps. I mention the caution because I've had other efforts with extraordinarily large stabs flop just as signally as this one seems to succeed. The inverted rudder was used as a convenience for the VTO, and is also handy because it is integral with the fuselage and in no danger of fatal shifting.

A few comments about building might be helpful. Use plenty of silk or nylon around the firewall. (I cover the whole fuselage with silk and work up the finish from that.)

The wing should be covered with silk for best results. Note that the tips are built a little differently than the center panels. First is the absence of the spar. The geodetic truss is very rigid and a spar is just in the way. But this means that some attention must be given to getting good cloth and glue skins on the dihedral joints at both the leading and trailing edge sheeting. In building the tips, lay out ¼ in. sheet outlines and the ¼ x ¾ LE. Then take full size ribs and chop them down to fit the Xs roughly. Cross and glue in place. Use a block and large piece of sandpaper, working chordwise, and sand down all the ribs together. On my tip panels I thin down the section progressively toward the tips, and end up with a rather thin and clean tip, which I don't think would help the glide importantly if the section were left to the full Gottingen. I suggest also leaving the bottom of the section flat on these tip panels. On the ribs at the dihedral joints, the easiest thing is to fudge a little with the full-size rib, cutting off a little at the back and sanding it down to the point, putting in the spar slot after the rib is in place.

It is wise to keep the stab weight down as much as possible. With the incidences shown, the CG ought to fall right on the wing TE, and a heavy stab will throw this off. Sickly soft wood should be avoided, but the stab should not be silk covered. Jap tissue is perfect, and the inverted rudder, itself silkened, keeps the stab from getting easily punctured.

Start easy on the testing. These things take a long time to build. About seven seconds of medium power with the prop backwards seems safest. I would suggest cranking in some stab tilt for a medium left glide circle from the start. This is a matter of taste, but I also suggest flying to the left under power. In order to do this, however, it is helpful to have about ¼ in. wash-in in the left inboard wing panel. Aim for about one and a half turns to the left under full power. For the VTO set-up, the only equipment needed consists of the three points required by the rules.

I think you'll like the Royono for its capacity to take a beating and still keep coming up with max's more often than not.

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"U"-1	1½"	2¼ ounce
"U"-2	2"	3 "
"U"-3	2½"	3¾ "
"U"-4	3"	4½ "
"U"-5	3½"	5¼ "
"U"-6	4"	6 "
"U"-7	4½"	6¾ "

CROSS SECTION SIZE 1¼" x 2-1/16"

TYPE "B" STUNT OR SPORT — 79¢
CROSS SECTION SIZE 1-1/16" x 1½"

"B"-1	1½"	1 ounce
"B"-2	2¼"	1½ "
"B"-3	3"	2 "
"B"-4	3½"	2¼ "
"B"-5	4"	2½ "

TYPE "C" TEAM RACER SPORT OR BOAT — 69¢
CROSS SECTION SIZE ⅞" x ⅞"

"C"-1	1-5/16	½ ounce
"C"-2	2-9/16	1 "

TYPE "F" STUNT OR SPORT — 49¢
CROSS SECTION SIZE 9/16" x ¾"

"F"-2	1"	⅛ ounce
"F"-3	1½"	3/16 "
"F"-4	2"	¼ "
"F"-5	2½"	5/16 "

TYPE "R"—RADIO CONTROL — 75¢ — 85¢
CROSS SECTION SIZE ⅞" x ⅞"

"R"-1	1½"	½ oz	(ONE SPEED)
"R"-2	2"	¾ "	"
"R"-3	2½"	1 "	"
"R"-4	1½"	½ oz	(TWO SPEED)
"R"-5	2"	¾ "	"
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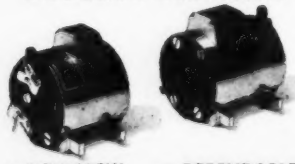

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PITTMAN

This Is Multi

(*Continued from page* 31)

filament and auxiliary controls without reducing the voltage available. The cells can be recharged about 100 times. This extends their life to about 3 years, even when used by the most active fliers. Their capacity is such that the average flier will need a charge only about every 20 flights and still have a factor of safety left. The disadvantages are, of course, their cost: $5.50 each or $22.50 for a complete set of four, plus the fact that they give very little warning, voltage-wise, when the end point of a cycle is reached. Both disadvantages can be coped with by charging often (every 20 flights) and spreading this total of 2000 flights (100 cycles x 20 flights per cycle) over a couple or three years. This breaks down to about 1c per flight. Not too bad? These figures are based on average drain receivers and servos. If you intend to use some of the real high drain equipment, then best you do some revising.

SERVOS AND CONTROL SURFACES

With the advent of the present-day multi-channel radio equipment and its extreme reliability, our "weakest link" now seems to be the servo mechanism. The perfect servo has yet to be designed. The requirements of, and demands on, a multi-channel servo are severe. They must be powerful, yet operate on low voltages with low drain. They must be positive-acting, yet sensitive. They must be quick acting, yet slow enough to allow for trimming. They must be free in moving, yet tolerate no sloppiness. Unfortunately, these requirements are difficult to satisfy as shown by the small number of commercial servos available. Most manufacturers consider the design of the perfect servo a greater challenge than the electronic equipment.

We have observed a great many home-built servos which perform with varying degrees of success. In building such servos one generally meets with a great many obstacles, and many have found that the easier way out is to use one of the commercial brands. One of the most successful is the new multi-channel servos put out by deBolt. These have nylon gears and supply ample power for today's multi planes. There is one for the rudder which is completely self-neutralizing, and one for the elevators which also self-neutralizes, but is adjusted so that in addition the elevator can also be trimmed slightly up or down. This trimming feature is a necessity. It allows one to compensate for changes in wind velocity. Instead of shimming the stab for windy weather flying, one merely "beeps" in the necessary down trim as called for by the plane's reaction.

Most elevator servos can be adjusted to provide three different neutralizing procedures. One is a return from "full up" to *exact* neutral. A second is a return from "full up" to only "up trim." A third is a return from "full up" to "down trim." The return from "full down" is just the opposite in each case. There are advantages in all three methods, but the author suggests that you start out with your elevators adjusted so as to return to exact neutral from either extreme. You then will have no "automatic" trim built in but will most likely have to retrim the ship after each violent maneuver. This is good practice anyway and after you become more experienced with the stick you can switch to one of the other methods easily enough.

One thing to watch for is that you have very little or no sloppiness in your link-

(*Continued on page* 46)

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C SPEED JUNIOR
Thomas Kovan
Dallas, Texas
Speed: 136.0 mph
Engine: McCoy 60
Fuel: Home brew
PROP: 9-12 POWER PROP
Plane: Original

COMBAT SENIOR
Bruce Brown
Levelland, Texas
Engine: Torp 35
Fuel: Testor "39"
PROP: 10-6 POWER PROP
Plane: Quicker

NAVY CARRIER JUNIOR
Donald Sterner
Belleville, Illinois
249.85 points
Engine: Fox 35
Fuel: Nitro X
PROP: 10-6 TOP FLITE
Plane: J. Roberts Sabre

B GAS FF JUNIOR
Dennis W. Alford
San Diego, Calif.
Time: 14:01.0
Engine: Johnson 29
Fuel: Ohlsson 200
PROP: 10-3½ TOP FLITE
Plane: Sandy Hogan

NAVY CARRIER SENIOR
Glen A. Magee
Cleveland, Ohio
307.16 points
Engine: Fox 59
Fuel: Own mix
PROP: 10-9 POWER PROP
Plane: Bearcat

R.O.W. GAS SENIOR
Lee Hines
Torrance, Calif.
Time: 10:15.0
Engine: Thermal Hopper
Fuel: Thimble Drone Racing
PROP: 6-3 PLASTIC TOP FLITE
Plane: Ramrod 250

RADIO CONTROL (MULTI)
Howard Bonner
Los Angeles, Calif.
197.5 points
Engine: Fox 35
Fuel: K&B 100
PROP: 11-6 TOP FLITE
Plane: Original

PROTO SPEED JUNIOR
Jere Draper
Cleveland, Ohio
Sp: 96.42 (New Record)
Engine: McCoy 29
Fuel: Home brew
PROP: 8-9 POWER PROP
Plane: Veco Redskin

FLYING SCALE CL JUNIOR
Wm. Bryant Brown
Louisville, Ky.
159 points
Engine: K&B 35
Fuel: Exothermic 28
PROP: 10-6 TOP FLITE
Plane: Ju 87B Stuka

FLYING SCALE CL JUNIOR
Jimmie McCroskey
Fort Worth, Texas
303 points
Engine: K&B 29
Fuel: K&B 100
PROP: 9-5 TOP FLITE
Plane: Mustang (orig.)

C GAS FF JUNIOR
Dennis W. Alford
San Diego, Calif.
Time: 12:50.7
Engine: Johnson 35
Fuel: Ohlsson 200
PROP: 10-5 TOP FLITE
Plane: Sandy Hogan

AM. CL. PAA LOAD OPEN
Willard Blanchard, Jr.
Hampton, Virginia
Time: 11:39.4
Engine: Thermal Hopper
Fuel: Thimble Drone Racing
PROP: 8-3 TOP FLITE
Plane: Payee

HELICOPTER
Parnell Schoonky
Kirkwood, Missouri
144.1 points
Engine: Atwood Sig.
Fuel: Nitro XX
PROP: 8-3 TOP FLITE
Plane: Original

STUNT JUNIOR
Dennis W. Alford
San Diego, Calif.
299.5 points
Engine: Johnson 35
Fuel: Home brew
PROP: 10-5 TOP FLITE
Plane: Thunderbird

A GAS FF JUNIOR
Gene Boyd
Los Angeles, Calif.
Time: 12:22.0
Engine: K&B 19
Fuel: K&B 100
PROP: 8-4 TOP FLITE
Plane: Original

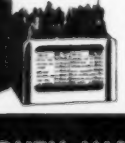
R.O.W. GAS JUNIOR
Dennis W. Alford
San Diego, Calif.
Time: 10:28.7
Engine: Johnson 35
Fuel: Ohlsson 200
PROP: 10-5 TOP FLITE
Plane: Sandy Hogan

RC (RUDDER) JR.-SR.
Gerald Nelson
San Leandro, Calif.
83 points
Engine: Fox 19
Fuel: Blue Blazer
PROP: 11-4 TOP FLITE
Plane: Live Wire Cruiser

B GAS F. F. OPEN
Richard McGrath
Long Beach, Calif.
Time: 28:35.1
Engine: Johnson 29
Fuel: Ohlsson 200
PROP: 10-6 TOP FLITE
Plane: Original

TOP FLITES
POWERPROPS

TOP FLITE



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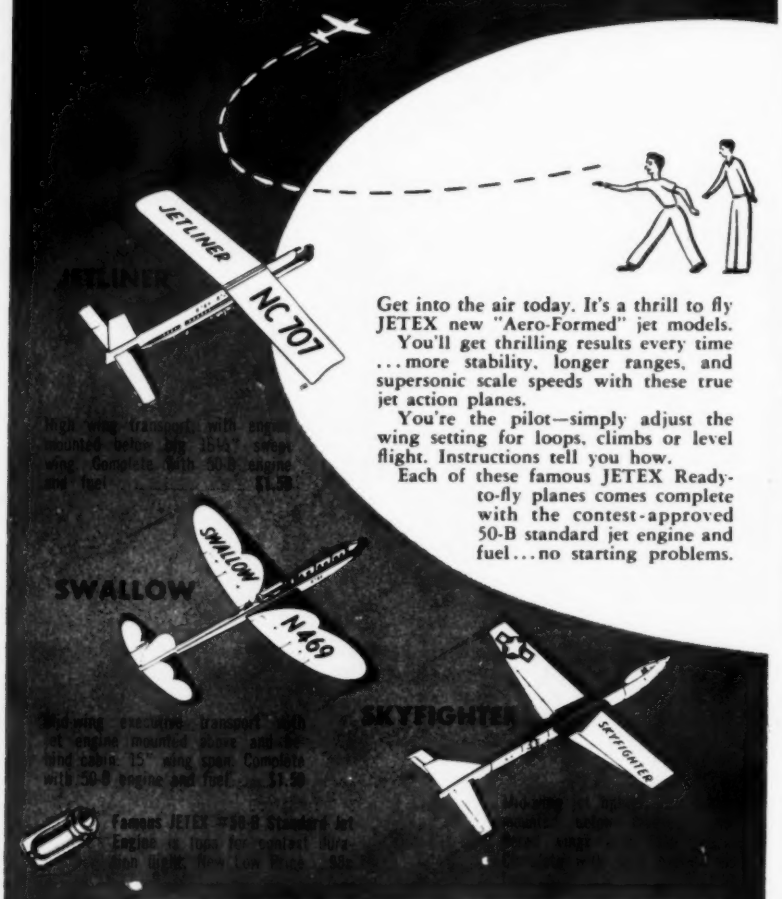

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ages. In escapement work a certain amount of this play is helpful to keep your system from binding up. But with servos in multi-channel you don't want any play. The smallest amount will make it very difficult to use properly the trimmable features of the elevator. Often the proper amount of trim is just a matter of a short pulse or "beep" of the control stick. Any play would absorb this small movement resulting in no elevator reaction.

Another thing to keep in mind is that you should always make your linkages so that the elevator is brought to the "up" position by a *pull* from the push-rod, not a push. Some unbelievable forces are built up at the high air speeds encountered in power dives. These are often enough to actually bend the push-rod against a positive stop. A rod bending during the attempted pull-out from a dive could have disastrous results, with no pull-out due to "flattening" of elevator.

While on the subject of push-rods it seems that the very minimum diameter wire to use is 1/16" piano wire. And then to have plywood bearings as close together as practical. Certainly at least every 6". Much future adjustment trouble can be avoided if you use some sort of variable length adjuster on each push-rod. The standard bicycle spoke nipple about 1" long is a readily available fitting. The spoke then becomes the end of the push-rod.

We have had good results by mounting both rudder and elevator servos on a plywood platform and then bolting this platform to the bottom of the fuselage with a single stud and wingnut. Between the fuselage bottom and the platform should be strips of ¼" x ⅜" weatherstripping (sponge rubber) glued to one of the two surfaces. This arrangement has the advantages of absorbing a certain amount of shock on hard landings and also provides a very quick method of dismounting both servos by merely loosening the single wingnut.

ENGINES, TANKS, AND PROPS

The requirements for a reliable power plant are very little different from those of any R-C model. Select one which is easy starting and capable of delivering high torque. The displacement as noted below can be somewhat greater than that recommended for your particular ship. Generally speaking, a radial mounting will lend itself better to off-set and downthrust adjustments. And if you take pains to beef up he firewall sufficiently, you won't find the engine back in the cabin after a bad landing. If the engine of your choice does not readily mount radially, try a mount

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along the lines of the one in the drawing. This can easily be bent up without special jigs from a single piece of half-hard 3/32" aluminum.

The fuel tank in a multi job has to be one which will feed in all positions. You won't be able to fly inverted by just relying on centrifugal force to keep the engine supplied with fuel. Pressure tanks are a possibility, but as a rule in the larger multi planes as many as 3 or 4 must be hooked together in parallel. A simpler solution is to install one of the large size Model B deBolt swivel tanks. Such a tank with its internal swivel pick-up which revolves with the mass of fuel will give you positive feed in an inverted position.

Propeller selection follows the same rules as for all R-C flying. One suggestion though is to experiment with one of the English flexible props made by Keil-Kraft. They are especially useful on touch-and-go landings when, by mistake, you might just nick the runway. The ordinary wooden props usually fracture at least one blade ending the flight right there. With a flexible prop you can often get away again, providing you didn't dig in too hard. (Editor—There is a loss in propeller efficiency, however.)

LANDING GEARS

As on all R-C planes, a strong landing gear is imperative. In addition, the gear on a multi ship must be rigid enough so that it isn't bent out of alinement by even the slightest amount. Because of the added control over the elevators and engine speed far more can be done on the ground than with a rudder-only ship. These ground maneuvers, such as prototype ROG's, touch-and-go landings, and precision landings are not only a source of contest points but they also are among the most realistic maneuvers that a model can perform. And to do them with any degree of accuracy the gear must always track perfectly true. One of the best designs is a two-wheel gear like the one illustrated. Here we have an arrangement which will absorb a great deal of shock by pivoting backward against the tension from the rubberband shock cords. This shock absorption is necessary for two reasons. First, it is almost impossible to attach a rigid gear in a manner that will hold up against the forces it is subjected to, as the gear can be no stronger than its source of anchoring which in our case is usually a balsa wood fuselage. Second, with the shock forces dissipated in the rubber, the resulting stress is not so great on the axles. And here is where we can tolerate absolutely no bending. As a rule, standard ¼" piano wire is strong enough for most ships up to 9 or 10 pounds, *except* for the axles. We've seen very lightly loaded ships on a bad landing bend a ¼" axle almost beyond repair. Therefore, it is strongly recommended that you use at least 5/32", or better yet 3/16", for the main axle. This latter size is more suitable for the larger ships of 9 pounds and over.

In mounting the gear try and position the wheels no more than 2" forward of the CG. Wheels placed too far forward will tend to make the ship hard to steer on take-offs with the often seen ground loop as the end result. Because of trimmable elevators you can get away with a gear farther towards the tail. A steep approach can be flattened out with just a little bit of up-trim as the wheels are about to hit. The landing gear then functions more like that of a full-size plane and

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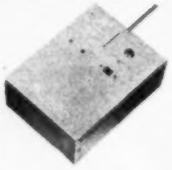

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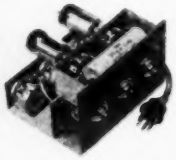

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doesn't have to have the nose protective qualities of one on a model without trimmable elevators.

Just a final word here about wheels. It has been found that a "flexible" or pivoting tail wheel will improve steering performance on the ground. This is especially true on slow ground speeds such as encountered in taxing in low or medium speed. A rigid tail wheel often "grooves" the plane and prevents the rudder from doing any actual steering. With a tail wheel along the line of the one in the illustration, the pivoting action allows the tail of the ship to swing out easily in the direction opposite to that in which you want to turn the plane. This is the same principle encountered in steering a boat. The plane is then more responsive to the rudder. You will have to experiment some with the optimum rubber band tension for your particular plane.

ENGINE SPEED CONTROL

It is doubtful if any single auxiliary control affords the fun that a *good* engine speed control does. With it you can do the very realistic type of take-off where the plane taxis out on the runway, comes to a full stop, then takes off with full throttle. Engine speed control is a necessity for touch-and-go landings, another maneuver which really tests the skill of the pilot. One of the most popular means of controlling the engine speed of both glow and ignition engines is with the Bramco Throttle. This device plugs into the venturi of the engine and needs only the thrust of a push to actuate it. This thrust can be supplied by a self-neutralizing escapement for two position or two-speed control (hi-lo) or better still by a servo such as the deBolt 3P or 3P3NX. Either of these servos require just one relay or channel to operate it and have three stops, or positions, giving high, medium, and low speeds. It has been found that if your power is great enough you can use high speed for take-offs and gaining altitude, medium speed for most cruising and stunting, and low speed for touch-and-go landings, power landings, and for stopping at an idle while on the ground. Such a plan allows you to gain that all important altitude needed between the finish of one maneuver and the start of another, without wasting too much valuable air time. This is especially advantageous in contest work. It all hinges on using an engine just one step more powerful than the one you had intended to use. But the danger is not evident as it might well be in an over-powered ship that had no means of controlling the engine RPM. There are times such as windy days or very hot days when that extra power is more than welcome. And you don't have to use it all (high speed, that is) if you don't want to.

There are two more details to cover here. First, make certain when installing your engine control servo that you go from low *directly* into high then to medium, then back to low. Do not go from low to medium to high. The reason for this is that often you will find that you will want full power *immediately* and you'll have just an instant available to get it. In other words, you'll want to get into high speed by just *one* quick push of your button, not two pushes. There are times, such as when you are attempting a touch-and-go landing, that you'll have your hands full guiding the plane in on the landing area, trimming out the approach angle, and then once you touch you'll want full power right away to get off again. So make sure you have high coming up next after low.

Another point to consider is that a fully variable or trimmable engine control on a model plane is not very practical. For one thing it will cost you two channels instead of just one. Secondly, you'll never know exactly just what position your engine control is in. Sound alone is often misleading. Thirdly, it will take too long to get from one extreme to the other. This time disadvantage was pointed out above. So stick to some sort of *positive position* servo so you'll always know what the engine is doing and what's coming up next.

THE SWING TO REEDS

No discussion of multi-channel would be up to date without mentioning the present situation regarding the use of tuned reeds or reed banks. It was not too long ago that reeds were considered as unreliable. Rapid progress has been made toward improving the design of these devices until we now find that they are the most popular method of decoding. And rightly so, providing the design and construction of the reed bank is sound.

In building your own reed bank or in evaluating one of the commercial brands, watch for these characteristics as they are imperative for trouble-free operation: The reeds must respond to just the one tone being transmitted with absolutely no sympathetic vibration of any of the other reeds. Don't tolerate *any* extraneous vibration such as is sometimes caused by harmonics. Make sure that none of the individual reeds are affected by outside vibrations such as a fast turning engine. A good check is to operate your equipment on the ground with the engine running on a much smaller prop than you intend to fly with. The increased RPM will bring out any borderline condition which might only occur during a power dive when the engine is running free. Also assure yourself that changes in temperature don't affect the response of the reeds. A properly designed reed bank should behave like a musical instrument and function equally well over a broad range of temperature conditions. Another very important evaluation is to make sure that each reed has a satisfactory band spread. Reeds that respond to just the peak of a given tone are not only dangerous but a nuisance because of the constant retuning necessary. Reeds *can* be designed so that they will vibrate satisfactorily even if the audio tone is not perfectly tuned. This is what

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you're looking for providing the slight drift will not cause another undesired reed to vibrate. And in addition make sure that the "contact time" is high. This is usually a percentage of *actual* contact between the reed and its upper contact as compared to the total time necessary for one complete vibration cycle. It can be checked easily with an ohm meter across an excited reed contact with the indicated reading being a percentage of the full scale reading. A "contact time" of less than 8-10% is not too reliable and may cause difficulties. If the reed bank you intend using passes these tests you should expect no trouble from this source whatsoever.

In conclusion, we wish to make the point that the foregoing remarks are merely observations and suggestions of an active R-C modeler and are not to be construed as the "last word" in any respect. The beauty of our hobby lies in the certainty that improvements will always be made, and made with rapidity. What's new in the Spring is often antiquated by Fall. Our problem just seems to be one of getting in a few flights during the Summer using the new ideas of the Spring before they become obsolete in October.

Gimlet

(*Continued from page* 10)

balsa rods should be left short enough, and the 3/64" piano wire should be long enough to allow the torque-rod units to be slipped forward and then back through the 1/16" I.D. tubing. Cement the tubing in place in the tail block and further check alinement. The torque-rod wires are now bent the proper amount at the rear, and the ready-formed Babcock linkage soldered in place at the escapement.

Finish and thoroughly sand the tail assembly. Perfect brass hinges were found to be really ideal, however, so use 3/64" diameter wire for the hinge pins rather than the 1/16" diameter supplied, as this allows more clearance and should eliminate any binding.

Add the rudder and stabilizer assemblies to the fuselage. The aerial is run along the inside of the fuselage, and out through the center of the stabilizer, so that it is completely enclosed.

Complete radio installation and check out operation of controls to see that movement is absolutely free. Add tank, dowels, etc., and plank top and bottom of fuselage with grain direction across fuselage.

To make the torsion-bar landing gear mounting bolts, heat the head of a 4-40 bolt cherry red and flatten out with a hammer on an anvil. Then drill a 3/32" hole. The 3/32" wire gear should be spaced with washers between the mounting bolts and plywood mount so that the gear is free to twist.

Cover the wings with silk and the fuselage and stabilizer with jap tissue. Use nitrate dope and any good fuel proofer for finish. Balance the model as shown on plan and check to see that wing has 3/16" to ¼" positive incidence. Use a 7-3 plastic prop to start with. If the Gimlet mushes under power and in glide, shim down the front of the wing. If glide is fast and steep and model climbs too slowly under power, shim down the rear of the wing.

Directional adjustments are made by bending the torque-rod wire at the rear to move the rudder. Thrust adjustment will vary with the individual model. On the first Gimlet no thrust adjustments were necessary. On the second, slight down and right thrust was needed.

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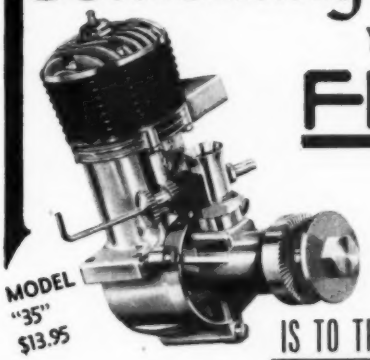

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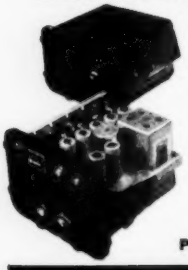

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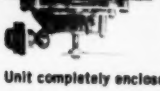

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If your model is fairly heavy and more power is needed, try using a 7-2 prop to let the engine turn up more.

You will find the low-wing Gimlet much more responsive and easier to fly than the conventional high or shoulder wing type.

Good luck, and keep a close check on your battery voltages.

The Bluetail Fly

(*Continued from page* 20)

surfaces to outline and sand the edges rounded. For dependable elevator hinges, we recommend aircraft pinking tape (may be purchased from your local airport or model shop). After cementing and doping, exercise these hinges to assure freedom of control action. The rudder is cemented into position with ⅜" offset to the outside of the flight circle.

The top center section of the wing should be sheeted and the controls temporarily installed before cementing the wing onto the fuselage. The controls should be oiled and again checked for smooth operation before covering the wing and sheeting the fuselage bottom.

Cover the wing with light rubber-model Silkspan, and dope with four or five coats of thinned butyrate dope. Sand all wood surfaces as smoothly as possible and give several thin coats of talcum powder-and-dope sanding sealer. Sand again with fine sandpaper before applying color dope. For best stunt performance the flying weight should not be over four ounces, but if you do not plan on doing vertical maneuvers, a good finish will give you a classy mantel display job between flying sessions.

Before flying your Blue-Tail Fly, be sure you have installed ½ ounce of weight in the outside wing tip and don't forget to check the center of gravity, making sure the balance point is not behind the position on the plans.

Fly Indoor for Fun!

(*Continued from page* 15)

down the drag.

PAPER-COVERED ROG—Endurance flying under a low ceiling isn't nearly as interesting for the expert as the larger indoor sites but it's a good place to learn and a lot of fun can be had. Small buildings and auditoriums can be closed fairly tightly. This eliminates drafts, which makes indoor duration flying easier, so there are certain advantages in small places. In a non-braced, paper-covered event some of the biggest building problems are eliminated, for paper is easier to handle than microfilm and, with the elimination of wire bracing, there is no straining of the eyes as well as the nerves. A good low-ceiling model for small places must have the ability to circle tightly and be able to bounce off of obstructions. Carl Rambo's Bouncer is one of the best of this type.

Our rules for this event are as follows: Wing area— 50 sq. in., no bracing of any type allowed; paper covering only; and all models must ROG. In constructing the Bouncer, the motor stick is formed around a 3/16-in. dowel with 1/32-in. thick by 1-in. wide light sheet balsa. The tail boom is cut from 1/16-in. sheet and tapers from ⅜ to 1/16-in. The main wing spars are light 1/16-in. square balsa with 1/32-in. square tips and ribs. The stab and rudder have a 1/32-in. square outline and ribs. The prop is carved from a ¾ x 1¼ x 4¾-in. block which is cut diagonally to make an 8¾-in. prop. The power is Pirelli rubber stripped to about 5/64 of an inch (see June 1956 on how to strip rubber), or 3/32-in. T56 rubber can be used.

Contest Calendar

Enter or visit these meets. Talk shop with fellow hobbyists. Write CD's for info.

SEPTEMBER

9—*Perth Amboy, N. J.:* Class AAA 5th Annual Flying Olympics for CL, CLS, CLC, and beauty. Adam Ginda, Jr., C.D., 21 Omaha Dr., Cranford, N. J.

9—*Arcadia, Calif.:* Class AA Team Racing Contest. Les McBrayer, C.D., 101-B Elm St., Alhambra, Calif.

9—*Harvey, Ill.:* Class A R/C3 Flying Meet for RC. Restricted to members of Radio Control Club of Chicago. R. E. Webb, C.D., 1621 E. 87th St., Chicago, Ill.

9—*Lakehurst, N. J.: Indoor Record* Trials for all indoor classes. Anthony J. Becker, Jr., C.D., 2212 Griffith St., Philadelphia 15, Pa.

9—*Chicago, Ill.:* Class AAA 13th Annual Midwestern States Championships for FFG, OHLG, OR, TLG and RC. Peter J. Sotich, C.D., 3851 W. 62nd Pl., Chicago 29, Ill.

9—*Bridgeport, Conn.:* Class AA Bridgeport Aeronuts R/C Event. Phillip D'Ostilio, C.D., 47 Cardinal St., Fairfield, Conn.

9—*Pittsfield, Mass.:* Class AA 5th Annual Berkshire County Model Airplane Meet for TR, CLS and CLC. Robert L. Elliott, C.D., P. O. Box 278, Pittsfield, Mass.

9—*St. Clair Shores, Mich.:* Class AA Team Racing Contest. Howard Lewis, C.D., 21520 California, St. Clair Shores, Mich.

16—*East St. Louis, Ill.:* Class AA Thermaleers' Model Airplane Contest for OR, FFG, PL, OHLG, CC and TLG. E. C. Linthicum, C.D., 7630 Hawthorne Pl., University City, Mo.

16—*Hartford, Conn.:* Class AA 2nd Annual Insurance City Team Racing Meet. Albert F. Zepka, C.D., 34 Highview Ave., Wethersfield, Conn.

16—*Wyandotte, Mich.:* Class AA 3rd Annual Radio Control Meet. B. Randall Cullin, C.D., 2658 Edgemont Rd., Trenton, Mich.

16—*Los Alamitos, Calif.:* Class AA

(*Continued on page* 52)

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16—*Buffalo, N. Y.:* Class AA 11th Annual Western New York Model Championships for RC, FFG, TLG, CL and CLS. Harold C. Keller, C.D., 39 Lorfield Dr., Snyder, N. Y.

16—*Sellersville, Pa.:* Class AA 2nd Annual B.C.F.M.A.C. Radio Control Meet. John F. Vandergrift, C.D., Furlong, Pa.

16—*Bethesda, Md.:* Pending.

16—*Phoenix, Ariz.:* Record Trials for FFG, OR, OHLG, TLG and CL. Quentin Webster, C.D., 521 E. Camelback, Phoenix, Ariz.

16—*Somerville, N. J.:* Class AA Thunderbirds Annual F.A.I. Gas Challenge for FAI Power teams. Krine Laffler, C.D., 53 Carlton Pl., Passaic, N. J.

16—*Tulare, Calif.:* Tulare Sky Kings Record Trials for FFG. Don Peacock, C.D., 912 Apricot St., Tulare, Calif.

22-23—*Winston-Salem, N. C.:* Class AA Winston-Salem 7th Annual Free Flight Meet for FFG, OR, TLG, OHLG, flying scale and RC. Loyd B. Hathaway, C.D., City Recreation Department, City Hall, Winston-Salem, N. C.

23—*Lakehurst, N. J.:* Indoor Record Trials for all indoor classes. Anthony J. Becker, Jr., C.D., 2212 Griffith St., Philadelphia, Pa.

23—*Gloversville, N. Y.:* Class AA 2nd Annual Fulton County Model Airplane Meet for FFG, CLS, CLC and RC. Elizabeth Orem, C.D., 27½ Clinton Ave., Albany 4, N. Y.

23—*Reading, Pa.:* Class AA Combat Jamboree for CLC. Charles P. Selin, C.D., 212 Pershing Blvd., Reading, Pa.

29-30—*Parsippany, N. J.:* Class AAA Tri-O-Rama Annual Meet for TR, rat racing, CLS, CL, NC, scale and CLC. Richard H. Palmer, C.D., Route 46, Parsippany, N. J.

30—*Fresno, Calif.:* Fresno Gas Model Record Trials for FFG. Jim Scheidt, C.D., 2225 Brown, Fresno, Calif.

30—*Detroit, Mich.:* Class AA Wakefield Team Event. Edwin G. Moran, C.D., 7245 Coolidge, Centerline, Mich. Pending.

OCTOBER

7—*Tulare, Calif.:* Class AA Central Valley Annual Free Flight Meet for FFG and TLG. Don Peacock, C.D., 912 Apricot, Tulare, Calif.

7—*Harvey, Ill.:* Class R/C3 Flying Meet for RC. Restricted to members of Radio Control Club of Chicago. R. E. Webb, C.D., 1621 E. 87th St., Chicago, Ill.

14—*Inglewood, Calif.:* Class AA Skywolves' Team Race. Don C. Crystal, C.D., 805 E. Palmer Ave., Compton, Calif.

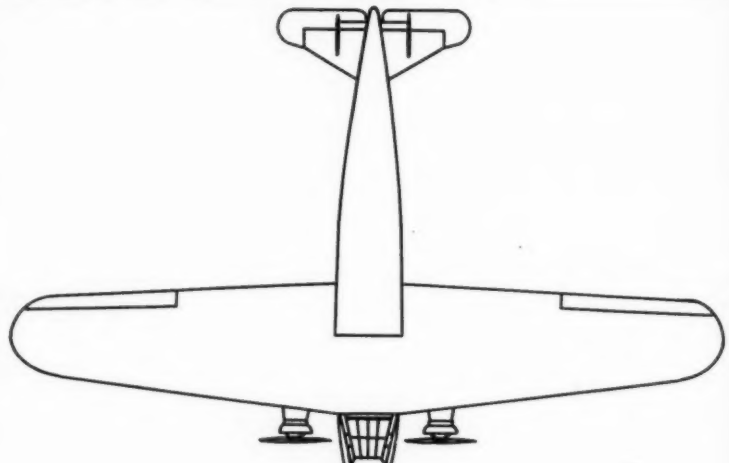
14—*Hatrford, Conn.:* Class AA Greater Hartford Fall Radio Control Contest. Robert H. Haines, C.D., 109 8th St., Newington, Conn.

14—*Phoenix, Ariz.:* Class AA Harry Duick Memorial Model Airplane Contest for RC, OHLG, FFG, OR or TLG. Quentin T. Webster, C.D., 521 E. Camelback, Phoenix, Ariz.

21—*Tulare, Calif.:* Tulare Sky Kings Record Trial for FFG. Don Peacock, C.D.,

28—*Fresno, Calif.:* Fresno Gas Model 912 Apricot St., Tulare, Calif.
Record Trials for FFG. Jim Scheidt, C.D., 2225 Brown, Fresno, Calif.

28—*Inglewood, Calif.:* Class AA Skywolves' Combat Meet for CLC. Don C. Crystal, C.D., 805 E. Palmer Ave., Compton, Calif.



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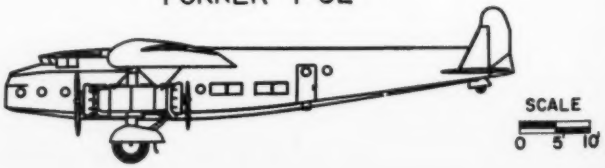

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Plane: **Slightly modified deBolt Live Wire Cruiser**
Engine: **Veco ".35"**
Propeller: **Top Flite**
Fuel: **Special Veco formula**
Finish: **Pactra Aero Gloss**
Elapsed Time: **24 Hours, 15 Minutes**
Mileage Flown: **Approx. 720 miles**
Average Flight Speed: **35 Miles Per Hour**
Time at Controls: **Pilots exchanged every half hour; no arm supports used**
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Foreign Notes

(*Continued from page* 39)

as the World C/L Championship event should also be dropped. These questions have arisen following some strange interpretations of rules and contest conduct by both competitors and officials at International C/L contests during the past two years in Europe.

Request Item

We often get asked for the addresses of foreign engine manufacturers by readers who are interested in purchase. In most cases we recommend writing the American agents if the motor in question is imported. For example: Oliver, Super-Tigre, Frog, Elfin, O.S. and David-Andersen are all imported by World Engines, Box 905, Warren, Ohio. The German Graupner Taifun range is handled by Wilshire Model Center, 1326 Wilshire Blvd., Santa Monica, Calif. We believe that A.H.C. also handles many foreign makes. To other specific inquiries: E.D. motors are made by Electronic Developments Ltd., West Molesey, Surrey, England; Typhoon engines by Miniatuurmotorenfabriek Typhoon, Keizersgracht 372, Amsterdam-C, Holland; Sabre engines by Gordon Burford and Co., 18 Surrey Street, Grange, Sth. Australia. The Czech MVVS jobs, however, are specials and are not available.

In Brief . . . .

ENGLAND . . . John Oliver tells us that he is now producing the Tiger Mk. III engine to the exclusion of all other products, and still has a year's backlog of orders. The Oliver-Tiger III .15 Diesel still dominates the team race field and is coming into increasing favor with free-flight contestants.

WESTERN GERMANY . . . We have mentioned magnet steering gliders in these columns previously. At a recent big Rhoen meet, aggregate times in the region of 45 minutes for three flights were put up by some of these models. It is reported that normal non-steering A2's, on the other hand, did not total more than 8 minutes.

JAPAN . . . Just received: first production example of the O.S. compound escapement mentioned and illustrated in FN June issue. Escapement provides selective left and right, plus second circuit switch on third position, using a three arm pawl. It is equipped with a smooth working linkage for direct coupling, via push-pull rod, to rudder.

CUBA . . . Tony Alvarado reports that the "one that got away" (A2 that hooked a ground-level thermal on test launch—see April FN) was returned intact four months later. Looking for another modeler's ship, searchers stumbled across A2 in one of the houses they visited. Tony also reports new FAI gas model in the making, cleverly named FAIsan, which is Spanish for "pheasant."

24 Hours or Bust!

(*Continued from page* 19)

back of the C.G.

The Veco .35 was mounted on a Fox radial mount by means of the back-door bolts which were safety wired to prevent vibration from working them loose. Then the mount was attached to a ¼ in. plywood firewall with four bolts, also safety wired. Tricycle landing gear was employed to allow the model to gather ground speed easily for quick take-off.

With construction completed the model was painted Swift White with a slight trim in red, a light color being used to make the model more visible during the night portion of our flight.

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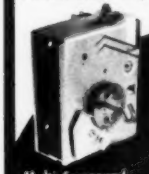

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arrived at last. We took the model to a large asphalt parking area where the plane would have a smooth surface for a good take-off. The flight, however, proved fairly unsuccessful as the weight and drag of the fuel line caused the model to bank dangerously inward. A trip to the workshop where large ailerons were added corrected this. The plane flew well with good control even though the fuel line had to be hooked with line connectors to the flying lines to prevent the fuel line from stretching out and trailing after the plane.

The first series of test flight were done with refueling equipment but no attempt was made to refuel. The quart tank was simply filled and the plane was flown until the model ran out of fuel (usually an hour) or else a rag was tossed into the prop.

Considerable tests proved a 11 x 6 Top Flite prop allowed the Veco to obtain full horsepower. Although miles per hour was low (around 30), the seven-pound airplane still was capable of gentle wingovers.

Our first attempt at refueling the plane in flight proved our means were ineffective for no matter how much pressure was applied to the fuel bulb the fuel would not flow at a sufficient rate through the 55-feet of fuel line. We realized then that a pump which supplied at least 25 pounds of pressure would be needed. At first it seemed impossible to obtain such a pump until we thought of a portable type garden sprayer. A 1½ gallon capacity sprayer was picked. This proved to be just the thing. Under maximum pressure, fuel was pumped at the rate of four ounces per minute. We installed a double filter network on the fuel line, consisting of an automobile type filter and a Sullivan fuel line filter making it impossible for foreign matter to reach our tank.

After the plane had been tested for a total of six hours and no further adjustment was necessary, we deliberately flew during a storm with a purpose of learning all characteristics of the plane, for during a 24-hour endurance flight one can never tell what he will come up against.

With everything in readiness, we patiently awaited a good week-end. The flight had been *tentatively* set for the April 8th week-end, but *rain* and bad weather caused a total of four postponements. Finally, Friday, May 4th, 1956, the local weather bureau assured us if we started that evening we would have approximately 24 hours of clear weather with a thunderstorm moving in Sunday. Not wanting to delay the flight further, we quickly gathered all necessary additional equipment which included 12 gallons of fuel, one quart of coffee, two heavy blankets, three flashlights, stop watch, sun glasses, extra clothing, candy bars, and necessary witnesses.

We arrived at the flying site, a high school playground, at 12 o'clock midnight, where we installed a muffler on our engine to cut down on any noise which might annoy neighbors at odd hours. The next chore was to set up a makeshift bed which we could rest on between flying intervals.

The exact time of take-off was 1:05 A.M. Saturday morning, May 5, 1956. The reason for the odd hour was to beat the storm which would arrive Sunday.

We each flew for one half-hour intervals with refuelings every 15 minutes. The fuel consumption was figured at a half-ounce per minute, which meant every 15

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minutes we pumped eight ounces of fuel. Not having a fuel-flow gauge on our fuel pump, our valve was opened for a period of two minutes each time at maximum pressure.

The first two hours proceeded uneventfully, although the plane was hard to see, two streets lights 250 feet away providing the only light. However, at three o'clock trouble rolled in, in the form of fog which was so thick the plane was not visible and, had it not been for the local police who used their spot lights to light up the airplane, the flight may have terminated then. Luckily, the fog rolled out in less than an hour and conditions returned to normal. The first days of dawn were welcomed heartily as the temperature during the night had dropped to under 30 degrees, making gloves and boots necessary.

During the day the flight proved a constant challenge as a brisk wind had come up and made it necessary to constantly walk backward in an eight-foot circle to assure flying tension, which resulted in a very tiring effort. Model plane enthusiasts came and went during the entire day, wishing us good luck and bringing small odds and ends, coffee and sandwiches.

The flight continued throughout the day and into the evening, at which point a slight rain made things miserable but, after this long, nothing was going to stop the flight and we kept going, round and round. A good burst of applause came at the nineteen hour mark as the old record was broken—which made conditions seem better. Five hours later, suffering from exhaustion, with the engine and plane still functioning perfectly, we purposely put down the airplane. We had a new World's Endurance Record. The landing time was 1:20 Sunday morning, May 6, 1956.

As a sidelight, it would have been very interesting to have been able to continue the flight until something other than ourselves had given out. The Veco surprisingly was in perfect condition and the airplane showed no signs of stress.

For statistics the following have been noted:

Total time aloft ..... 24 hrs. and 15 min.
Average rate of speed . 30 miles per hr.
Distance covered .....721.5 miles
Total fuel consumed ..... 8 gal.
Total engine revolutions 11,960,000
Total Piston travel,
1.495.000 ft. or 283 miles.

Pre-Flight Tester

(*Continued from page 25*)

unit is simple and inexpensive to duplicate with standard parts and hand tools and is a one evening project, so to speak.

The circuit drawing is self-explanatory, and any good millimeter of the desired range will prove satisfactory. However, proper polarity as indicated in the circuit drawing must be observed. The value of the "Pot" is not critical, and a 250,000 ohm unit will take care of most conditions. The batteries may range from 22½ to 67½ Volts and higher. If possible, use the same voltage as is being used in the RC receivers being checked. Old receiver batteries may be used to good advantage. The entire unit may be built into a 4" long x 3" wide x 2" high aluminum interlock box.

You will notice the word "Adapter" in the photograph. These units plug into a miniature three-hole socket of the ⅜" diameter hole chassis mounting type at the top of the box. The adapter in use is of the type that is commonly used in conjunction with a closed circuit jack to measure plate current. The phone plug

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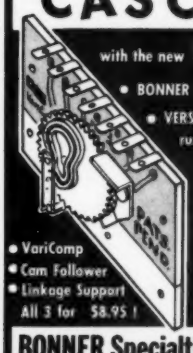

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shown is of the standard ¼" size. If it is desired to use the miniature jacks and phone plugs, an additional adapter could be made by simply using the polarized miniature three-prong plug on one end and the miniature phone plug on the other.

If the adapter that is plugged into the case (see picture) is removed and in its place, the lower adapter, as shown, is plugged in and the alligator clips are connected to each side of the relay coil, then the meter may be used to check relay "pull-in" and "drop-out" ranges.

Keep the plate current--measuring adapter leads as short as possible. The relay checking adapter leads may be of any convenient length. The batteries may be held in the box by simply wedging with scraps of balsa. A work of caution! When testing relay operating ranges, start with the resistor in "high resistance" position. Then back off to the proper settings. This will avoid possible meter damage. Also, when through using relay testing "adapter," remove it from the socket.

Solid Scorpion

(*Continued from page 36*)

large and heavy airplane. This was the case with the XF-89, which weighed over 40,000 lbs. fully loaded, twenty times as much as a World War I fighter, four times as much as a World War II fighter, and two-thirds the weight of the famous B-17 "Flying Fortress." The requirement was not unreasonable, however, for the high thrust of the jet engine would more than handle its weight. The new specifications also called for speeds in excess of 600 MPH.

This great speed presented a problem to the engineers in reference to wing-design: a normal high lift wing, or a laminar flow wing will reach a point at which shock waves form and compressibility begins to affect the flight characteristics of the plane. This is called the "critical mach." One method of forestalling this compressibility was to design a swept wing, which would have caused many engineering headaches in the design of so large a craft. The second method of solution was to design a thin wing.

It was known that a reduction in wing thickness of 25% would increase the critical mach number by 12½%. With this in mind the XF-89 was given a wing root thickness of 8¾% (of chord at that point) and a wing tip thickness of 7⅛%. It had the same result as building a wing with an 18 to 20 degree sweepback. However, most present-day swept-wing aircraft have a sweepback of 35 degrees for optimum efficiency. This required additional design. Another law of aerodynamics states that a reduction in aspect ratio (ratio between span and mean chord) of 25% would increase the critical mach number by 15%. This design factor was now added to the thin wing in the XF-89 so that the combination resulted in a mathematically swept wing of 35 degrees. In addition, this straight wing had many advantages of stability and control not heretofore obtainable in a sweptback wing.

The thin wing is not without its structural problems, such as insufficient height for the main spar to produce adequate bending strength. This was overcome by having a short span, in comparison to the long root chord of 15 feet. At low speed the thin wing showed many disadvantages, and it was necessary to introduce special devices to meet certain safety requirements. Northrop attained full span flaps for additional lift on the P-61 "Black Widow" by using a retractable wing-edge. On the XF-89 it was impossible to use this type of control as the wing lacked sufficient thickness for its installation. Instead, a double-slotted flapaileron which was split

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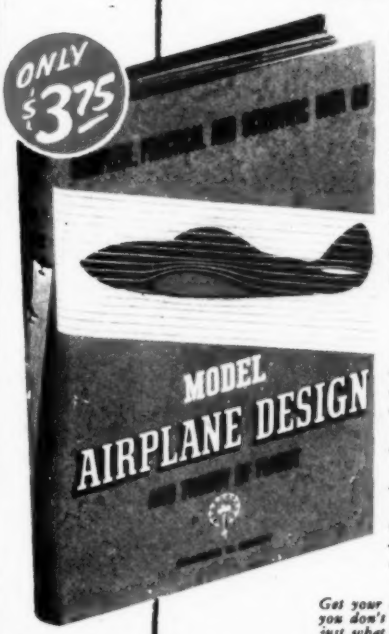

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horizontally down the center was developed; the principle being that the lower half would work in conjunction with the inboard wing flap to provide full span coverage for high lift, and at the same time provide high drag for slowing down the aircraft on the landing roll. In flight the two segments operate together and act as a conventional aileron. The third function of split flaps is to open in opposition and to act as an air-brake, permitting rapid deceleration in maneuvering. This unique device has aptly been called a "Decelerón" and reportedly is a most efficient three-in-one design.

The XF-89 was tested and accepted by the Air Force, but before the production version appeared changes in configuration had to be made. The prototype's rather blunt nose was replaced by a sharper section, due to aerodynamic consideration and the installation of a smaller radar antenna. The addition of afterburners enlarged the engine housings and modified the aft section to give the turbulent hot exhaust free passage to the rear. The "D" model currently being delivered to Air Force units has large attached wing-tip fuel tanks whose forward sections contain 104 rockets.

This unique fighter deserves a place in each modeler's collection. The view shows the F-89D, with the markings of the 67th Fighter Interceptor Squadron.

Radio Control News

(*Continued from page 25*)

TECHNICAL TOPICS

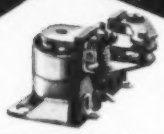
Many users have condemned the mercury type cells for failing at some crucial time during their use. We'd like to point out that the cells differ from the regular carbon-zinc dry cell, not only in construction but in operating characteristics. The mercury cell is basically a long-life cell, at relatively low current drains. As with any component or piece of equipment, reliable operation cannot be expected unless the manufacturer's specifications are adhered to. In the case of the small mercury cells used for filament power, they are usually marked as to their capacity in 'MAHR' or milliampere hours. As with any other type of battery, the voltage will drop as the current drain is increased. A mercury cell about the size of a conventional pencell is rated at 2400 mahr. It is desirable, therefore, to limit the current drawn from this size of cell to about 100 ma. At the end of 24 hours, this cell will be at the end of its useful life. However, the endpoint voltage of cells, as given by manufacturers, is generally .8 to 1 volt, a value too low for reliable operation of most RC equipment. In view of this, a life of about 18 hours can be expected, with the endpoint voltage being approximately 1.15 to 1.2 volts, The theoretical peak voltage of a mercury cell is 1.345v as compared to 1.5v for the conventional carbon-zinc cell. The mercury cell has a life curve which is fairly flat under normal loads. At the end of its life, however, the voltage takes a rather sudden plunge, thus adding to the assumption that the battery just won't hold up.

When using mercury cells, keep a log of operating time and you'll be perfectly safe. The mercury cell, while slightly heavier than a comparable conventional cell, has a high power output efficiency and will continue to deliver uniform power throughout its useful life. The conventional cell will give a continuous drop as its life increases under load. The Lafayette Radio catalog 5-56 gives a chart on current drain and capacity of various mercury cells. We believe you'll be seeing

(*Continued on page 62*)

Babcock's

BR-3



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Designed by Don McGovern and Bill Ehrgo

The Curtiss Hawk "P-6E" is one of the great [fighter] models of the Air Force. It was our best pursuit [plane] in the early 1930's. Berkeley's model is authentic, [scaled] out deviation from rare service manuals supplied [by] the Air Force Technical Museum. The complete [detail] the famous "17th Pursuit Squadron" from Selfridge [Field], Mich. make it a really beautiful model to own [and fly].

WORLD WAR II FIGHTERS

Features retractable-extensible landing gear, throttle, flap, elevator and rudder [control]

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"P-51 MUSTANG"

37" Wingspan — For .19 to .36 Engines

(Redesignated P-51 in 1947) Over 15,000 Mustangs were built in World [War II]. Most widely used version was the P-51 "D". This airplane probably [saw] combat than any other design in history. Still flying with reserve units and [in] foreign Air Forces. Powered by 1,490 h.p. Packard, Rolls Royce Merlin or [Allison]. Armament was six .50 caliber machine guns. Maximum speed [over] 400

Known as one of the fastest climbing fighters of all time, the Bearcat is an excellent subject for Carrier Deck Flying. "Autotrol" rudder operation eliminates slackening control lines.

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Republic

"P-47 THUNDERBOLT"

40¾" Wingspan—For .29 to .65 Engines

A total of 15,329 Thunderbolts were produced during World War II and was one of the most famous fighter bombers ever built. Eight .50 caliber machine guns. 2,300 h.p. Pratt & Whitney R-2800 engine. 426 m.p.h.

- Deep Drawn Metal Cowl
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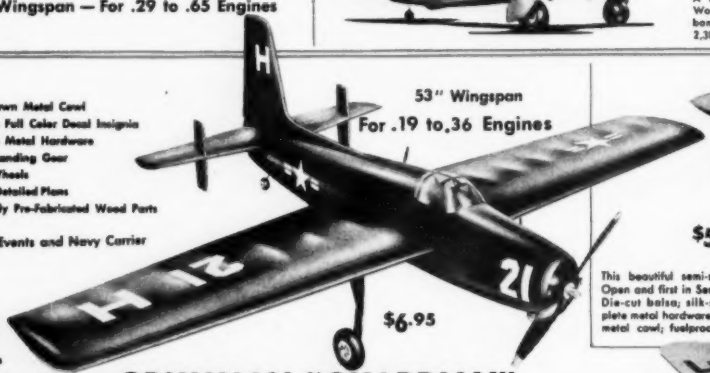

53" Wingspan

For .19 to .36 Engines

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Bob Ellior's

SEMI-SCALE STUNT

GRUMMAN "GUARDIAN"

Designed as a Torpedo bomber, the "Guardian" was modified as a search aircraft for anti-submarine operations. Two models were flown, AF-2W equipped with electric gear served as a "hunter" while the AF-2S carried the bombs and acted as the "killer". Powered by a 2,400 h.p. Pratt & Whitney R-2800 fourteen cylinder radial engine. Carries crew of four. Range 1,500 miles—maximum speed 315 m.p.h.

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SEMI-SCALE STUNT

"P-40 WARHAWK"

For .19 to .36 Engines — 45" Wingspan

This beautiful semi-scale stunt controline won first in Open and first in Senior at the Tangerine Internationals. Die-cut balsa; silk-screened celluloid canopy; complete metal hardware including Jim Walker "U-Control"; metal cowl; fuelproof Flying Tiger decals; stunt flaps.

$4.95

NORTH AMERICAN AT-6 "TEXAN"

(U. S. Navy Designation SNJ-5)

Wingspan—¾" scale—For "19" to "33" Engines

The "T-6" has been taught more people to fly than any other airplane. Hundreds of thousands of pilots who flew this plane will thrill to see this model perform. Beautiful to look at and easy to handle. With its stunt airfoil, it can do everything in the rule [book].

TRAINERS

$5.95

North American "T-28"

For .23 to .36 Engines — 30" Wingspan

This new Air Force Trainer aligns itself on the Step-Keel, included in kit. Tri-cycle landing gear, metal cowl, bubble canopy, U-Control.

$5.95

Beech Aircraft's T-34A "MENTOR"

For .14 to .29 Engines — 33" Wingspan 1" Scale

Proportions of the T-34A are perfect for Controline flying. Easily assembled by the "Step-Keel" method, the fuselage is balsa planked. The wing is reinforced to absorb landing impact. "U-Control" is used together with the optional "Autotrol" Rudder system. Decals are complete and include even the smallest details.

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Canopies & Turrets
Hardware

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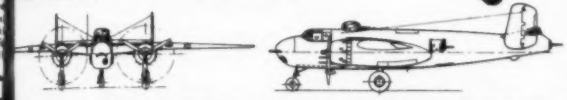
- Full Size Detailed Plan



For .09 to .019 Engines — ¾" Scale — Big 42" Wingspan — 33" Overall

All Balsa Construction — No Paper Covering Required!

Berkeley's North American $12.95 B-25 "MITCHELL"

General Jimmy Doolittle's Historic "Tokyo Raider"

- 3-WHEEL RETRACTABLE SHOCK MOUNTED LANDING GEAR
- OPERATING WING FLAPS

With twin engines screaming, the B-25 roars across the field. In 100 feet it's airborne and the gear retracts. With lessened drag and increased speed, it's responsive to every control. Who can tell it from its prototype as throttled down, it settles in for a power on landing, flaps down, gear down and locked. Individually shock mounted gears flex upward and rearward on impact. Gun the engines now and off you go again. Perfect for the Navy Carrier event, this detailed scale replica is easily assembled from this masterful kit.

jet air intake for Jetex cooling, thrust aug-
...No access hatches to mar finish. Jetex unit
ot scale size jet exhaust opening with ease
full depth ply wing spar plus sheet planking
support engine nacelles under landing impact.

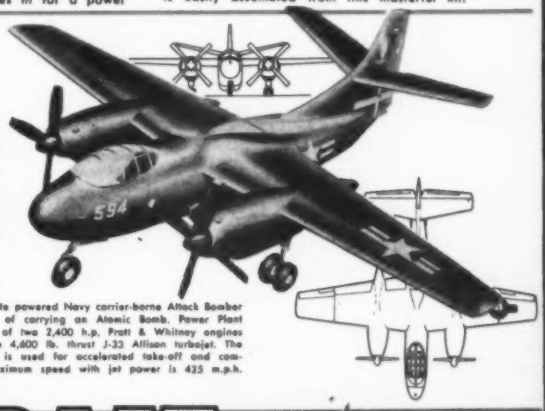
wo .045 to .099 Engines plus Jetex 100,
or Jetmaster 150 unit, for exact scale power.
Wingspan — ¾" Scale from factory plans.
Jetex unit for reserve power & scale effect)

KIT FEATURES:

- Carved & Hollowed Fuselage!
- Carved & Hollowed Nacelles!
- Five Metal-Hub Rubber Wheels!
- Complete Decals!
- Embossed Bubble Canopy!
- Deep-Drawn Metal Engine Cowls!
- Shaped Leading & Trailing Edges!
- Die-Cut Ribs, Bulkheads, Etc.

We urge you to see this kit. Few airplanes lend themselves to model work as well as this Atomic Carrier Bomber. It is designed for active flying, with none of the usual frailties. Carved fuselage and nacelles make it very easy to assemble. Climbs on one engine, uses Jetex (internally mounted) for scale effect and reserve power only. Perfect scale throughout!

$6.95



North American AJ-1 "SAVAGE"

U. S. Navy Atom Bomb Carrying Fighter!

(No deviations from scale on this model)

Composite powered Navy carrier-borne Attack Bomber capable of carrying an Atomic Bomb. Power Plant consists of two 2,400 h.p. Pratt & Whitney engines and one 4,600 lb. thrust J-33 Allison turbojet. The turbojet is used for accelerated take-off and combat. Maximum speed with jet power is 425 m.p.h.

PERSONAL AIRCRAFT

$5.95

SSNA "195"

to .49 Engines
6" Wingspan

This beautiful lightplane features Step-Keel construction. Formers are positioned by a removable jig. Metal cowl, die-cut parts.

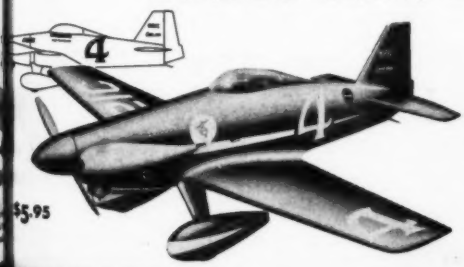
U.S.A.F. designation LC-126A. This five place cabin monoplane was designed for business flying. The Air Force has used the "195" for Arctic rescue work fitted with ski landing gear. 300 h.p. Jacobs engine. Maximum speed 180 m.p.h. — 165 m.p.h. cruising.

$5.95

"SHOESTRING"

.14 to .36 Engines — 28" Wingspan

This Continental Trophy winner makes a perfect controline kit includes metal hardware; formed metal wheel pants; metal spinner; formed sheet metal landing gear; metal bushed rubber wheels; die-cut balsa; plastic bubble canopy; fuelproof decals; hardwood mounts; die-cut plywood; covering material; full size detailed plans.



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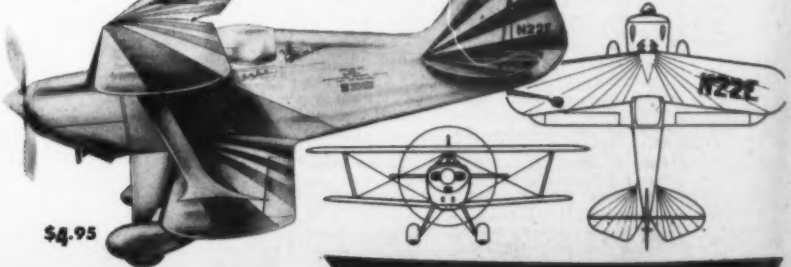

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MINNOW" Cosmic Wind

For .09 to .36 Engines — 28" Wingspan

Probably the most famous Goodyear Racer of all. Step-Keel Fuselage, wheel pants, metal spinner, cowl, complete decals, canopy, U-Control.

Betty Skelton's "PITT'S SPECIAL"

For .19 to .33 Engines — 25½" Wingspan

This colorful stunting biplane stands apart on any field. Decals include red flare design. Metal cowl, wheel pants, celluloid, etc.

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more of them as transistor circuitry becomes more widely used.

For the benefit of new RC fliers, we'd like to point out the fallacy of using peak transmitter power in lieu of proper tuning. Assume that a transmitter has a power input of 2 watts and is capable of reliably operating a receiver at a distance of 1000 feet. In order to double the range of the transmitter, having it operate the receiver at 2000 feet, requires a power input of 4 watts. In other words, the power required to double the effective range amounts to the value of the square of the original power. RC receivers, operating on any of the commonly used frequencies, have been actuated by transmitters having a power input of one watt or less, to a range in excess of that encountered in flying the model. We've noticed that very few fliers bother to obtain the proper ground checks when tuning their receivers and that their transmitters are not always tuned according to instructions. If radio waves can be bounced off of the moon and picked up back on earth, with the transmitter putting out no more power than the average floor lamp consumes, there is no reason why a model cannot be controlled at a distance of less than 1000 feet with no more than 2 or 3 watts of input power.

Earlier this year, Babcock Radio Engineering, Inc., announced the formation of a separate corporation, Babcock Models, Inc., Van Nuys, Calif., to handle manufacture and sales of models and model equipment. Nationally known modeler, Chuck Hollinger, has joined the firm as Chief of Design, collaborating with Dick Schumacher, as consultant.

One of the most common, and at the same time unrecognized, causes of unreliable operation in an RC installation and in the design of equipment, is the use of low voltages. By this we mean the use of 1½ volts on certain actuators, insufficient voltage in relay circuits, thus preventing a reliable current change and even poor connections and small cross-section conductors—too thin wires—which make for larger voltage drops. This does not refer to filament circuits which are usually capable of operating on voltages down to 1.1 to 1.2 volts. Voltage is the force required to 'push' current through a conductor and as such must be great enough to overcome resistance in one form or another. This resistance can be of the common type, as found in the actual ohmic resistance of the conductor or it can consist of oxide films or poor soldered connections. Low voltages can force current flow through the wires commonly used in RC work, with very little loss. However, when 1½ volts is up against an oxide film or a high resistance solder connection, there is usually sufficient voltage drop to render the actuating unit inoperative. To overcome these difficulties would require increased voltage or cleanliness of contacts and well soldered connections. If the voltage cannot be increased, be sure the contacts involved are clean and soldered connections are well made. Another thing we shudder at, is the way some builders and designers operate relays. If the manufacturer's specification calls for the relay to close on 1.2 ma. they will adjust the circuitry to allow 1.3 ma. to flow through the relay coil, and assume this is sufficient. If it requires 1.2 ma. to close the relay, what's wrong with 2 or 2.5 ma. flowing through the coil? The higher current will provide the needed safety factor to assure reliable operation under conditions of vibration and lowering battery voltages. In summing this up use wire sufficiently large to carry the

required current with little or no voltage drop through the wire, keep contacts clean and make good solder connections. Use enough voltage to produce the needed current in a relay coil, to overcome oxide films on commutators and to reliably start electric motors under load.

NEWS ITEMS

One item is the model SF-100 Flash soldering iron, manufactured by the Phillips Mfg. Co., Inc., Dept. KP, 2816 Aldrich Avenue, Minneapolis, Minn. This unit is capable of operating from auto batteries of from 6 to 12 volts, AC or DC, or from the 110-volts AC step-down transformer. Weighing but 6 ounces, this iron will furnish all the heat necessary to make a field repair on your RC equipment in from 4 to 6 seconds. It also has inter-changeable tips, allowing for a variety of uses. Perhaps this will help solve the soldering iron problem that several readers have written in about.

Babcock Models, Inc., 14743 Lull Street, Van Nuys, Calif., (a division of Babcock Radio Engineering, Inc.), after bringing out the Breezy, Jr., a prototype Goodyear Racer RC job, now presents a Diesel yatch. Known as the Little Breeze, this 31½" long, 7¾" beam model of the yatch built for Mr. J. M. Case, Oyster Bay, New York, is complete to all details. A plastic hull and die-cut mahogany plywood superstructure make for a rugged boat which can be driven by a 9002-B Pittman motor. Practically any radio gear besides the Babcock 465 mc. equipment and the BCR-4 A and BCR-3 receiver may be used, since the scale waterline leading allows between 6 and 7 pounds total weight.

The Aristrol transmitter, Polk's Model Craft Hobbies, 314 Fifth Avenue, New York, N. Y., is an MOPA, or Master Oscillator Power Amplifier, type of transmitter and, as such, is very stable, even though the actual power dissipated by the final stage is relatively low. Proper tuning of receivers and transmitters will eliminate fly-aways. The transmitter also is available as a kit and includes the case, printed wiring chassis, tube and crystal.

The Aristo-Rev. motor, Polk's Model Craft Hobbies, is being used by more and more RC boat fans.

A re-cap of items discussed in this column shows that the CG reed equipment, made by CG Electronics Corp., 305 Dallas, Albuquerque, New Mexico, has pushed its way to the top in near record time. Howard Bonner, using the 5-channel equipment from CG, piled up a record 202 points on a single flight. These transistorized reed receivers, using a 1AG4 for the detector, are unusually stable and sensitive and are very economical as far as battery drain is concerned.

Should you decide to make a club project of several large RC jobs this coming winter, and want a source of gear boxes and/or motors for actuators, it would pay to investigate the Wilson's of Cleveland No. 1049 gear train with 8-100 Hi Drive motor. This unit measures overall 3⅜" x 3" x 2⅜" and weighs 6 ounces. The reduction is 662 to 1 and the output shaft is ¼" diameter for the side plates, other than the 1/16" aluminum. The power available is more than enough for the most stringent application and operation may be had on from 1½ to 6 v. We modified several units to reduce the weight and size and to lessen the speed reduction ratio. (Wilson's of Cleveland, 425 Lakeside Ave., N.W., Cleveland, Ohio.)

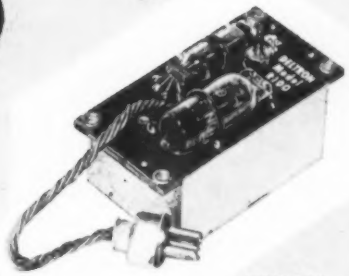
The Citizen-Ship motor speed control accessory kit, Model MSC, selling for $3.95, as mentioned in last month's column, has been further tested by the staff and found to be reliable in all respects.

GET STARTED RIGHT

WITH

DELTRON

R/C EQUIPMENT



Whether you're a contest flyer, or new to R/C, you'll want a receiver of proven dependability, ultra sensitivity, light weight and small size.

You get all these features, and many more when you buy DELTRON.

Built with highest grade components, the DELTRON is featherweight, compact and extremely sensitive. With its enclosed relay and rugged construction, it is virtually crash proof.

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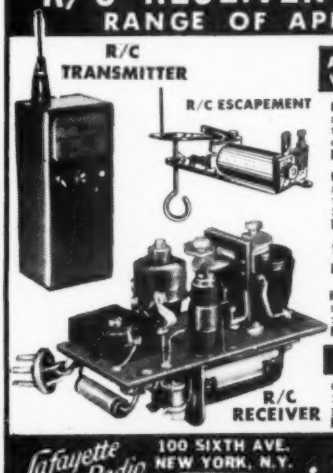
RANGE OF APPROXIMATELY 1 MILE



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R/C Transmitter is completely assembled, tested and guaranteed, and includes tube and 27.255 MC crystal. 6 section telescoping antenna. Size: 4" x 4" x 12". Less batteries. Shpg. wt. 3 lbs.
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R/C Escapement is completely wired, sturdy and self-neutralizing. Weighs ½ oz. Low current drain. Size: 1⅝" L x 1⅛" W. Shpg. wt. 5 oz.
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- **Operating Wing Flaps** radio or controline actuated
- **Laminated Structure** stronger, lighter, easier

To lighten, strengthen and simplify assembly, the areas you would normally have to plank or carve from block are now die-cut laminations. **$6.95**

BIG 1½" SCALE — 54" WINGSPAN FOR .09 to .19 ENGINES

Here is the latest scale "Cessna" that is a "natural" for radio control. The big proto ship takes-off and lands with "hands-off" control. The model handles just as easy! It's a model builders dream ship!

The kit is very complete in true Berkeley tradition with prefabricated wood parts, silkspan, landing gear and hardware, plus the super-detailed plans and full-colored authentic decals found only in Berkeley Kits.

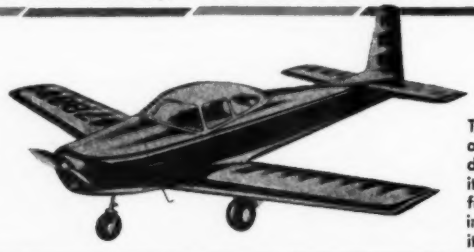
NAVION "Super 260"

For .29 to .35 Engines Radio Control

For .23 to .29 Engines Free-Flight

For .29 to .65 Engines Controline

(U.S.A.F. designation: L-17) A four place business airplane also used by the U.S. Army and Air National Guard. Originally built by North American Aviation. Power—260 h.p. Lycoming. Maximum speed—163 m.p.h.



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